Honeywell Enraf

# Card Descriptions and Wiring Manual

## Load Computer 1010 CJ

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CHAPTER 4 Solid State Relays

Glossary

# CHAPTER 1 CARD DESCRIPTIONS AND TERMINAL LAYOUTS

The terminal layouts in this document show a typical 4-arm configuration. Where the number of arms is less than 4 ignore the arm connections on the terminal diagrams that relate to the arms not being used.

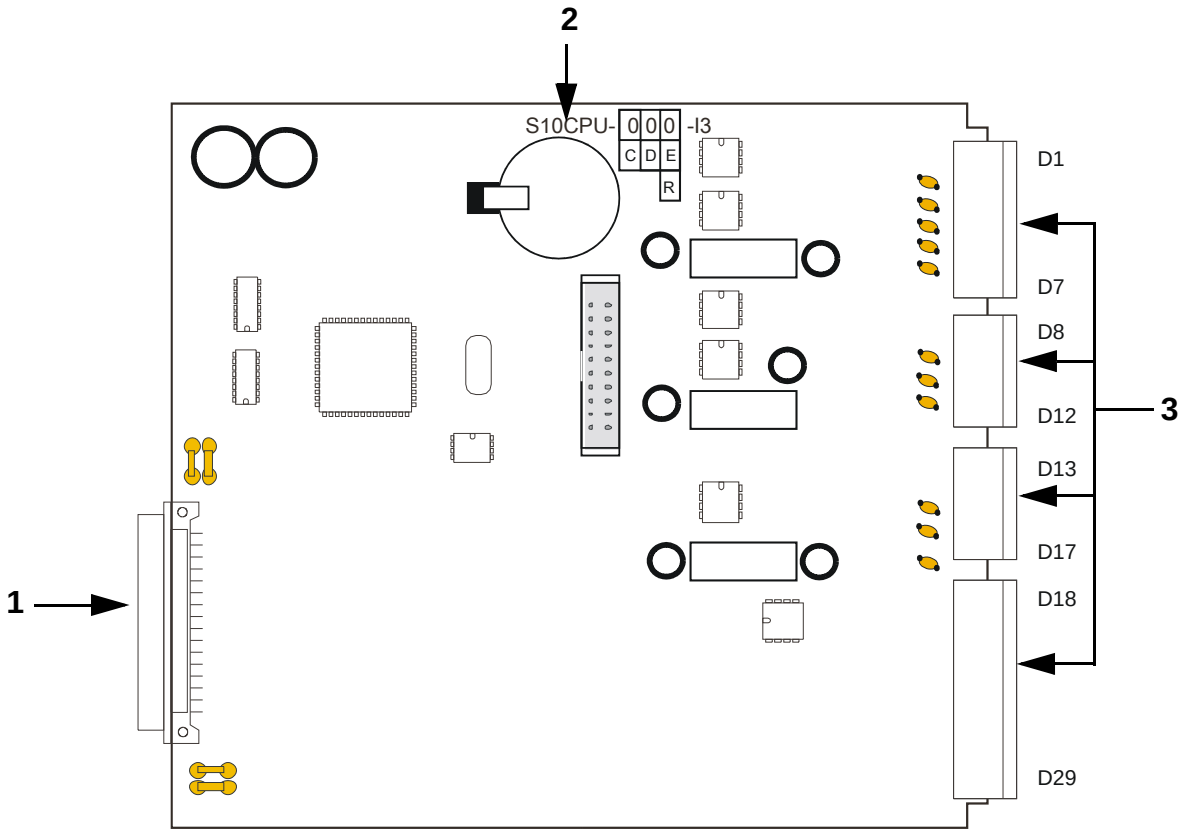
## 1.1 CPU Card - S10CPU-xxx-I3

### 1.1.1 Card Description

This CPU card is designed to work in the 1010 C series of loading instruments. The 1010 C series instruments feature a large graphics display, battery backed real time clock, and non-volatile flash memory, which is used to store all configuration and transaction data.

The card has three isolated communication ports, which can be set up through software via configuration settings.

- Port 1: Isolated RS485/422/232 (standard)
- Port 2: Isolated RS485/232 (standard)
- Port 3: Isolated RS485/232 (standard)




| Item | Description |
|---|---|
| 1 | Motherboard connector |
| 2 | Part and Issue numbers |
| 3 | Wiring terminals |

The card also has inputs that are software selectable for the following:

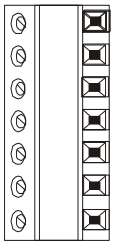
- RF ID reader
- Touch Key (2 key inputs) using MTL zener barrier
- Touch Key (2 key inputs) without barrier

- Two logic inputs
- Touch Key via MTL zener barrier and one logic input
- Touch Key without barrier and one logic input

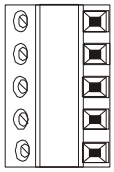
### 1.1.2 Replacement Batteries

Use only 3 volt lithium batteries, size CR2032.

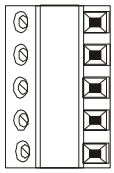
### 1.1.3 Terminal Descriptions



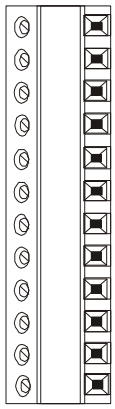
| | |
|---|---|
| D1 | - Port 1 Rx RS232 |
| D2 | - Port 1 Tx RS232 |
| D3 | - Port 1 0V Common |
| D4 | - Port 1 Rx+ RS422 |
| D5 | - Port 1 Rx- RS422 |
| D6 | - Port 1 Tx+ RS422 |
| D7 | - Port 1 Tx- RS422 |



| | |
|---|---|
| D8 | - Port 2 Rx RS232 |
| D9 | - Port 2 Tx RS232 |
| D10 | - Port 2 0V Common |
| D11 | - Port 2 Rx/Tx+ RS485 |
| D12 | - Port 2 Rx/Tx- RS485 |



| | |
|---|---|
| D13 | - Port 3 Rx RS232 |
| D14 | - Port 3 Tx RS232 |
| D15 | - Port 3 0V Common |
| D16 | - Port 3 Rx/Tx+ RS485 |
| D17 | - Port 3 Rx/Tx- RS485 |



| | |
|---|---|
| D18 | - Signal Ground |
| D19 | - Signal Ground |
| D20 | - +5V to Reader |
| D21 | - Card Int/Touch Key#1/In #1 |
| D22 | - Card Data/Touch Key#2/In #2 |
| D23 | - Card Present |
| D24 | - 4-20mA Channel 1 V+ |
| D25 | - 4-20mA Channel 1 Iout |
| D26 | - 4-20mA Channel 2 V+ |
| D27 | - 4-20mA Channel 2 Iout |
| D28 | - 4-20mA Channel 3 V+ |
| D29 | - 4-20mA Channel 3 Iout |

## 1.2 Input Card - S10NA

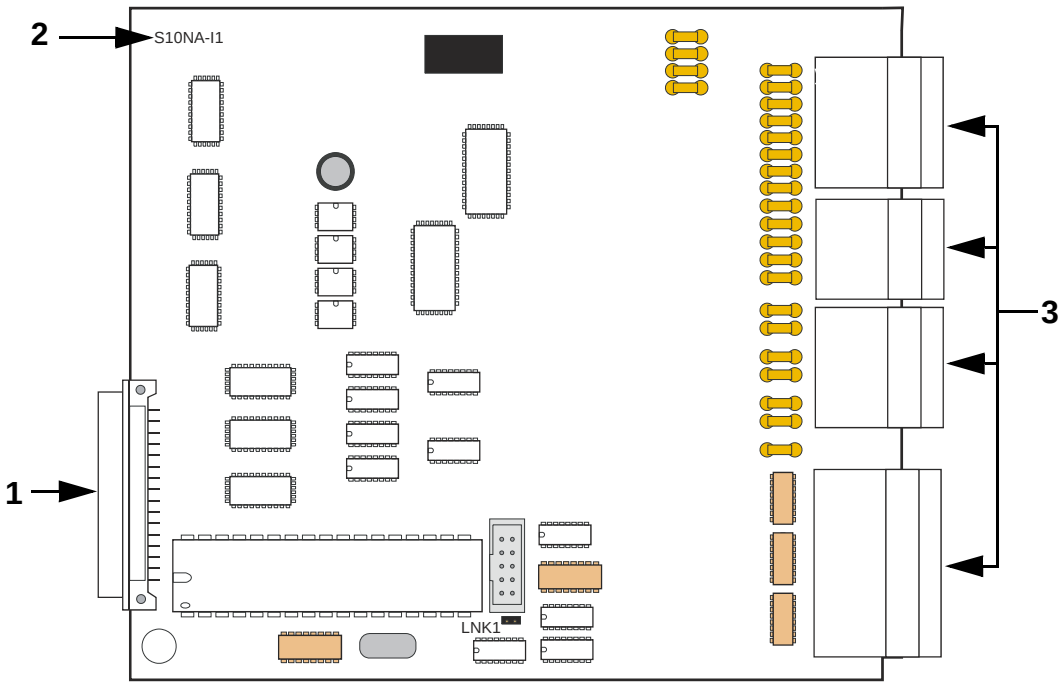
### 1.2.1 Card Description

The S10NA is a general purpose input card designed for 1 to 4 arm systems. This is a general purpose input card and is composed of the following input functions:

- 4 x RTD/4-20 mA temperature inputs
- 4 x 4-20 mA inputs, which can be used for pressure
- 4 x flow meter inputs (dual inputs on each channel)
- 16 x general purpose inputs

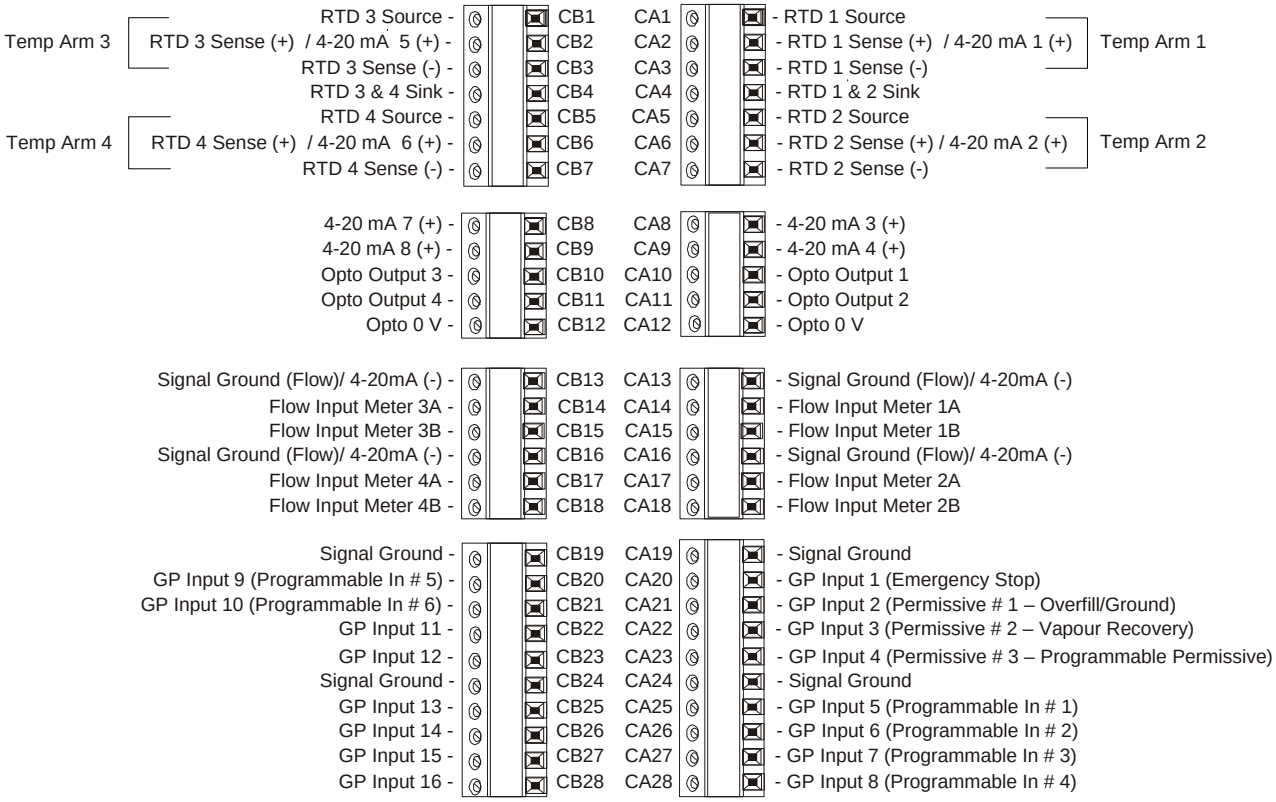
Each input has transient protection.

- An unscaled opto output is coupled to the “A” side of the flowmeter input circuitry to retransmit the flow signal. This output can be used for proving or for driving additional registers.




| Item | Description |
|---|---|
| 1 | Motherboard connector |
| 2 | Part and Issue numbers |
| 3 | Wiring terminals |

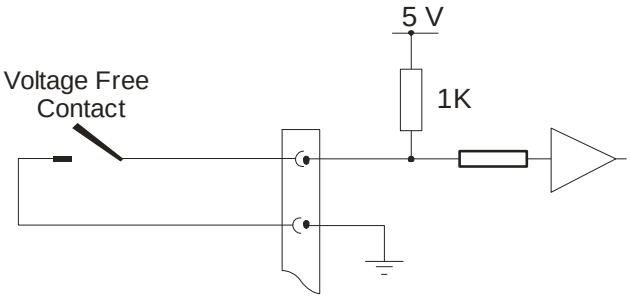
### 1.2.2 Terminal Descriptions


Temp Arm 3
RTD 3 Source - CB1
RTD 3 Sense (+) / 4-20 mA 5 (+) - CB2
RTD 3 Sense (-) - CB3
RTD 3 & 4 Sink - CB4
RTD 4 Source - CB5
Temp Arm 4
RTD 4 Sense (+) / 4-20 mA 6 (+) - CB6
RTD 4 Sense (-) - CB7
CA1 - RTD 1 Source
CA2 - RTD 1 Sense (+) / 4-20 mA 1 (+)
Temp Arm 1
CA3 - RTD 1 Sense (-)
CA4 - RTD 1 & 2 Sink
CA5 - RTD 2 Source
CA6 - RTD 2 Sense (+) / 4-20 mA 2 (+)
Temp Arm 2
CA7 - RTD 2 Sense (-)
4-20 mA 7 (+) - CB8
4-20 mA 8 (+) - CB9
Opto Output 3 - CB10
Opto Output 4 - CB11
Opto 0 V - CB12
CA8 - 4-20 mA 3 (+)
CA9 - 4-20 mA 4 (+)
CA10 - Opto Output 1
CA11 - Opto Output 2
CA12 - Opto 0 V
Signal Ground (Flow)/ 4-20mA (-) - CB13
Flow Input Meter 3A - CB14
Flow Input Meter 3B - CB15
Signal Ground (Flow)/ 4-20mA (-) - CB16
Flow Input Meter 4A - CB17
Flow Input Meter 4B - CB18
CA13 - Signal Ground (Flow)/ 4-20mA (-)
CA14 - Flow Input Meter 1A
CA15 - Flow Input Meter 1B
CA16 - Signal Ground (Flow)/ 4-20mA (-)
CA17 - Flow Input Meter 2A
CA18 - Flow Input Meter 2B
Signal Ground - CB19
GP Input 9 (Programmable In # 5) - CB20
GP Input 10 (Programmable In # 6) - CB21
GP Input 11 - CB22
GP Input 12 - CB23
Signal Ground - CB24
GP Input 13 - CB25
GP Input 14 - CB26
GP Input 15 - CB27
GP Input 16 - CB28
CA19 - Signal Ground
CA20 - GP Input 1 (Emergency Stop)
CA21 - GP Input 2 (Permissive # 1 – Overfill/Ground)
CA22 - GP Input 3 (Permissive # 2 – Vapour Recovery)
CA23 - GP Input 4 (Permissive # 3 – Programmable Permissive)
CA24 - Signal Ground
CA25 - GP Input 5 (Programmable In # 1)
CA26 - GP Input 6 (Programmable In # 2)
CA27 - GP Input 7 (Programmable In # 3)
CA28 - GP Input 8 (Programmable In # 4)

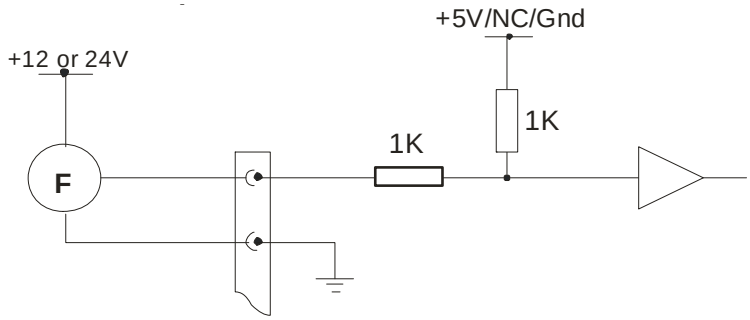
### 1.2.3 Notes

1. Flow inputs provide for dual pulse signals from each flow meter as a pulse integrity check of the flow signal. Flow meter 1 therefore has two inputs, 1A and 1B.
2. Temperature Input share a common ground.
3. All switch inputs on CA20 to CA28 must be voltage-free switch contacts from a relay or switch.
4. All inputs must be shielded. For CE compliance, shields should be connected at one end only and wired to the chassis earth.

### 1.2.4 Switch Inputs

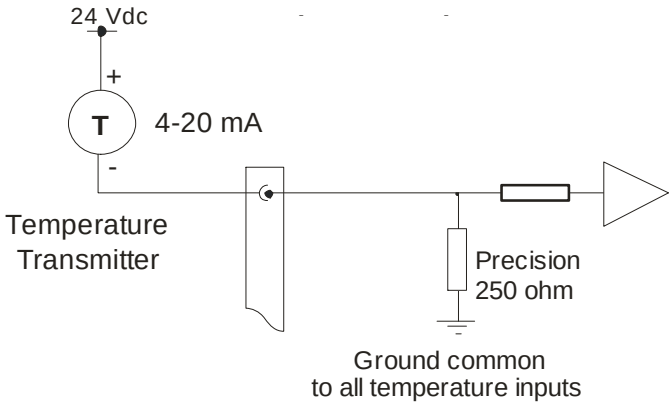



### 1.2.5 Flowmeter Inputs




Open Collector (Pullup to 5V)
Pulse (Pullup not connected)
Namur (Pullup to 0V)

### 1.2.6 Temperature Inputs




The type of flow meter input can be selected through the configuration menu.

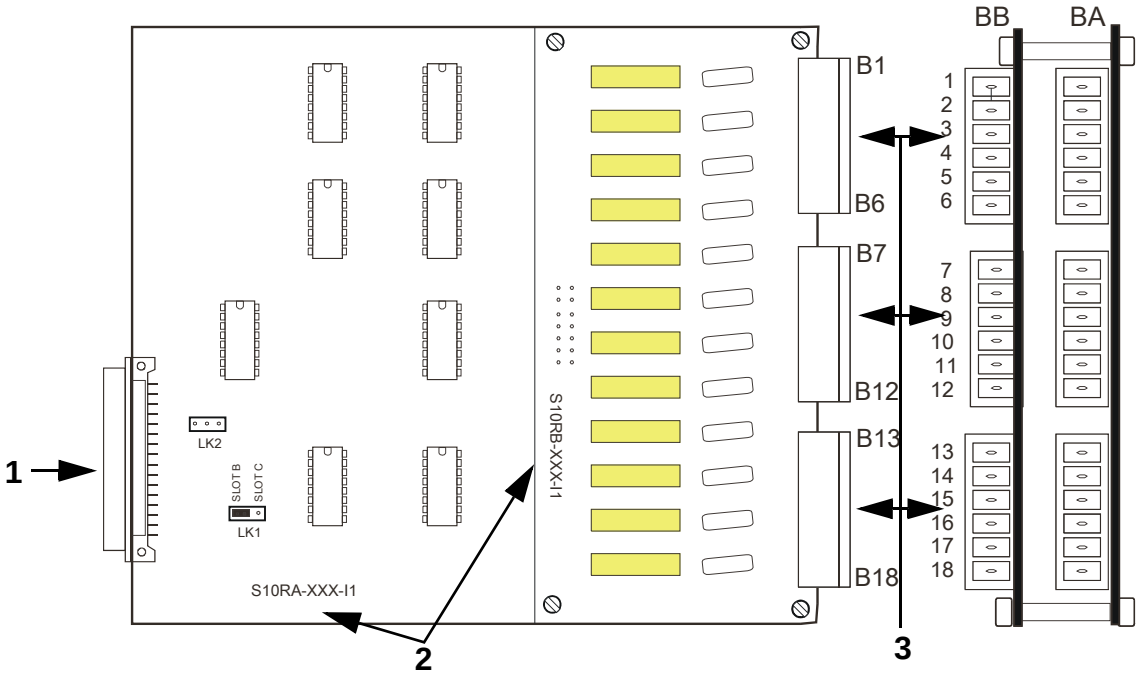
## 1.3 Output Relay Card - S10RA-XXX-RB-XXX

### 1.3.1 Card Description

This card is a general purpose relay output card and is made up of 24 relay outputs. The S10RB-XXX-I1 card is mounted onto the S10RA-XXX-I1 card, each providing 12 relay outputs.

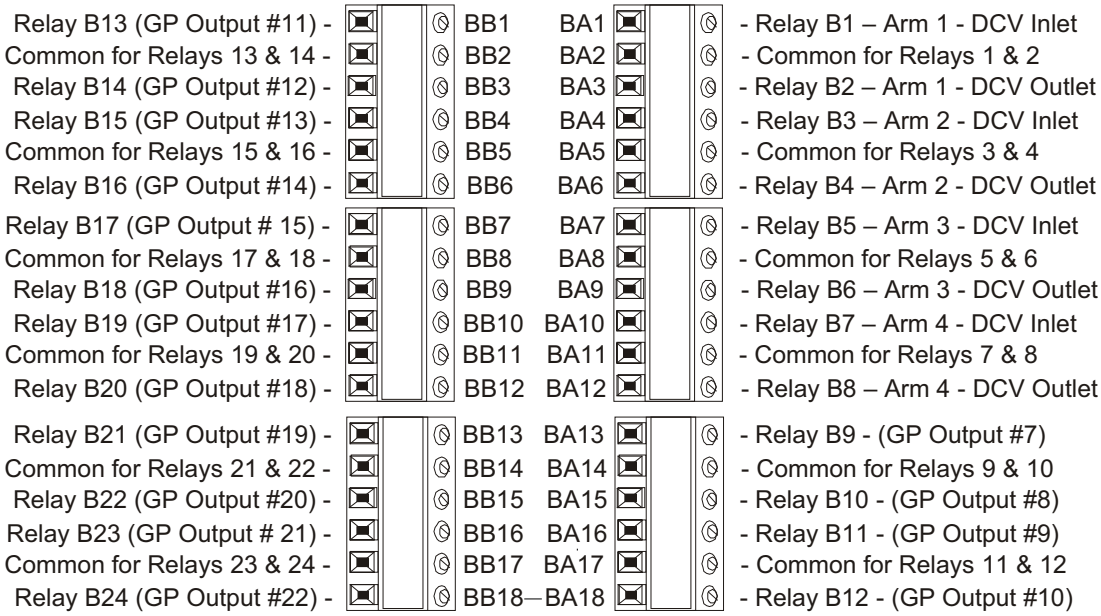
- Relays can be 100-240 Vac solid state or Electromechanical
- The X in S10RA-XXX can either be S or R depending upon the type of relays on board. (S indicates solid state and R indicates Electro-mechanical relays).
- There are a total of 6 relay banks each having 4 relays. Each bank can be of different relay types. The default combination is S10RA-SSR-RB- RRR.
- Electromechanical relay outputs have MOV's across the output.

The solid state relay outputs are suitable for driving digital control valves where continual switching of the outputs would otherwise wear out a mechanical relay. The outputs are fully isolated and capable of driving only A.C. voltages. The outputs have a snubber network across the output to minimise voltage spikes when switching inductive loads such as coils.




| Item | Description |
|---|---|
| 1 | Motherboard connector |
| 2 | Part and Issue numbers |
| 3 | Wiring terminals |

### 1.3.2 Terminal Descriptions


Relay B13 (GP Output #11) -
Common for Relays 13 & 14 -
Relay B14 (GP Output #12) -
Relay B15 (GP Output #13) -
Common for Relays 15 & 16 -
Relay B16 (GP Output #14) -
BB1
BB2
BB3
BB4
BB5
BB6
BA1
BA2
BA3
BA4
BA5
BA6
- Relay B1 – Arm 1 - DCV Inlet
- Common for Relays 1 & 2
- Relay B2 – Arm 1 - DCV Outlet
- Relay B3 – Arm 2 - DCV Inlet
- Common for Relays 3 & 4
- Relay B4 – Arm 2 - DCV Outlet
Relay B17 (GP Output # 15) -
Common for Relays 17 & 18 -
Relay B18 (GP Output #16) -
Relay B19 (GP Output #17) -
Common for Relays 19 & 20 -
Relay B20 (GP Output #18) -
BB7
BB8
BB9
BB10
BB11
BB12
BA7
BA8
BA9
BA10
BA11
BA12
- Relay B5 – Arm 3 - DCV Inlet
- Common for Relays 5 & 6
- Relay B6 – Arm 3 - DCV Outlet
- Relay B7 – Arm 4 - DCV Inlet
- Common for Relays 7 & 8
- Relay B8 – Arm 4 - DCV Outlet
Relay B21 (GP Output #19) -
Common for Relays 21 & 22 -
Relay B22 (GP Output #20) -
Relay B23 (GP Output # 21) -
Common for Relays 23 & 24 -
Relay B24 (GP Output #22) -
BB13
BB14
BB15
BB16
BB17
BB18
BA13
BA14
BA15
BA16
BA17
BA18
- Relay B9 - (GP Output #7)
- Common for Relays 9 & 10
- Relay B10 - (GP Output #8)
- Relay B11 - (GP Output #9)
- Common for Relays 11 & 12
- Relay B12 - (GP Output #10)

Notes:

* Relay B1, B3, B5 & B7 - Two Stage Valve - Slow Flow
Digital Control Valve - Inlet
On/Off Valve - On and Off

** Relay B2, B4, B6 & B8 - Two Stage Valve - High Flow
Digital Control Valve - Outlet

### 1.3.3 Notes

Link 1 provides addressing for the board so that it may be mounted in slot B or C.

- Card Mounted in Slot B (Default)

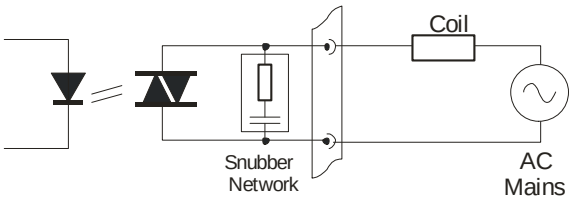
  Link in positions A & B (as shown above )

- Card Mounted in Slot C

  Link in positions B & C

*NOTE: Link 2 is not required.*

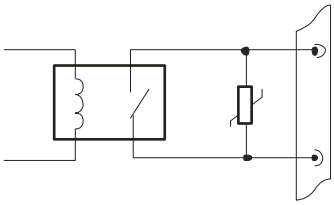
### 1.3.4 Solid State Relay Outputs




- Switching Voltage: AC Only 90 - 240 Vac, 1 Amp max.
- Transient Protection: Snubber Network 47 nF, 47R

### 1.3.5 Electromechanical Relays

- Rating: 240 Vac, 30 Vdc Max, 1 Amp max.
- Protection: 275 Vac MOV transient protection



## 1.4 Power Supply Card—S800PS4-6

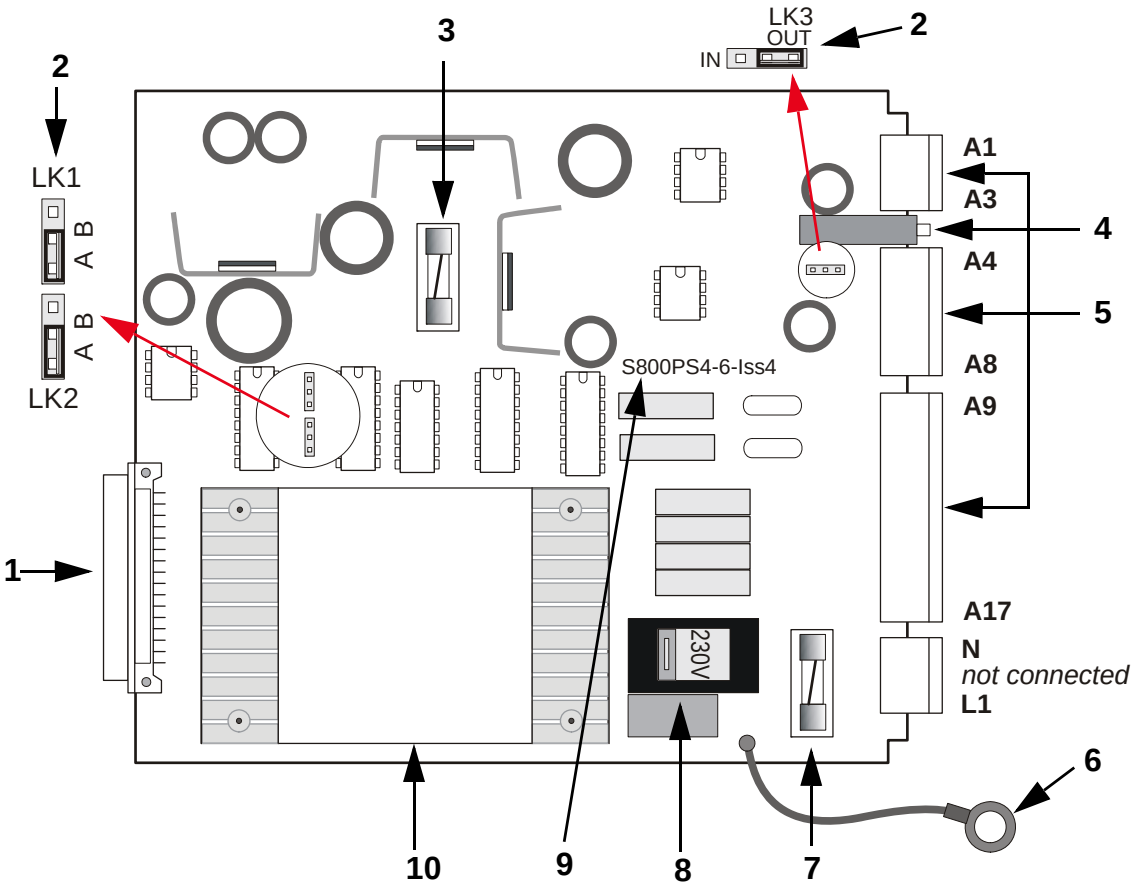
### 1.4.1 Card Description

This card is a general purpose power supply card. It is made of the following:

- 110/220 Vac mains input
- 6 electromechanical relay outputs
- 5 to 30 Vdc power out (100 mA max.)
- 12 Vdc power out (250 mA max.)

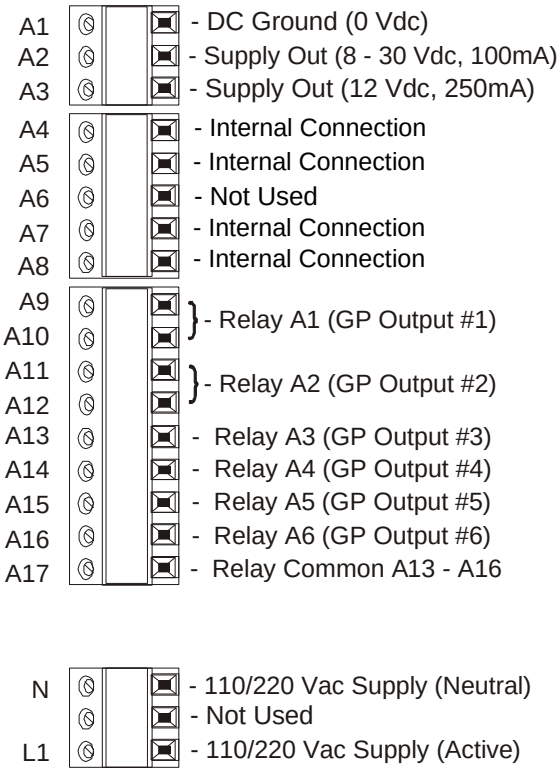
Mains voltage is selected by a switch on the board and can be either 110 Vac (95 to 135 Vac) or 220 Vac (190 to 260 Vac). A 500 mA fuse and varistor provide protection on the mains inputs against power spikes and short term overvoltage connection.

The 5 to 30 Vdc power output is adjustable by means of a trim potentiometer adjacent to terminal A3. This should be adjusted with a screwdriver while monitoring the resultant voltage on terminal A2 with a voltmeter. The default value when shipped from the factory is 24V.



| Item | Decription |
|---|---|
| 1 | Motherboard connector |
| 2 | Link |
| 3 | DC fuse, 250 Vac, 1.5 A Slow-Blow Size: 20 x 5 mm (used only in DC operation) |
| 4 | DC voltage adjustment |
| 5 | Wiring terminals |
| 6 | To chassis (earth for CE compliance) |
| 7 | Mains fuse, 250 Vac, 500 mA Slow-Blow Size: 20 x 5 mm |
| 8 | Mains selection, 110 or 220 VAC |
| 9 | Part and issue numbers |
| 10 | Mains transformer |

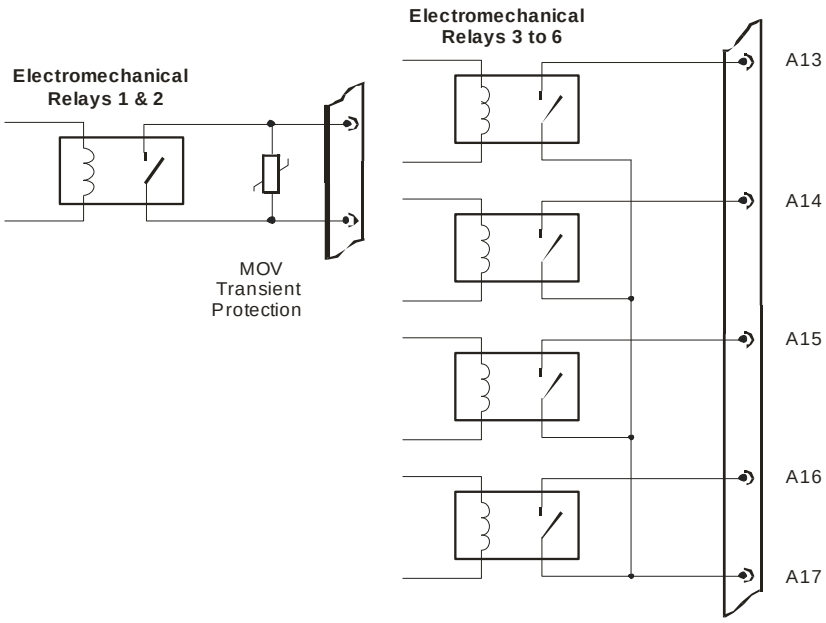
### 1.4.2 Terminal Layout



### 1.4.3 Electromechanical Relays

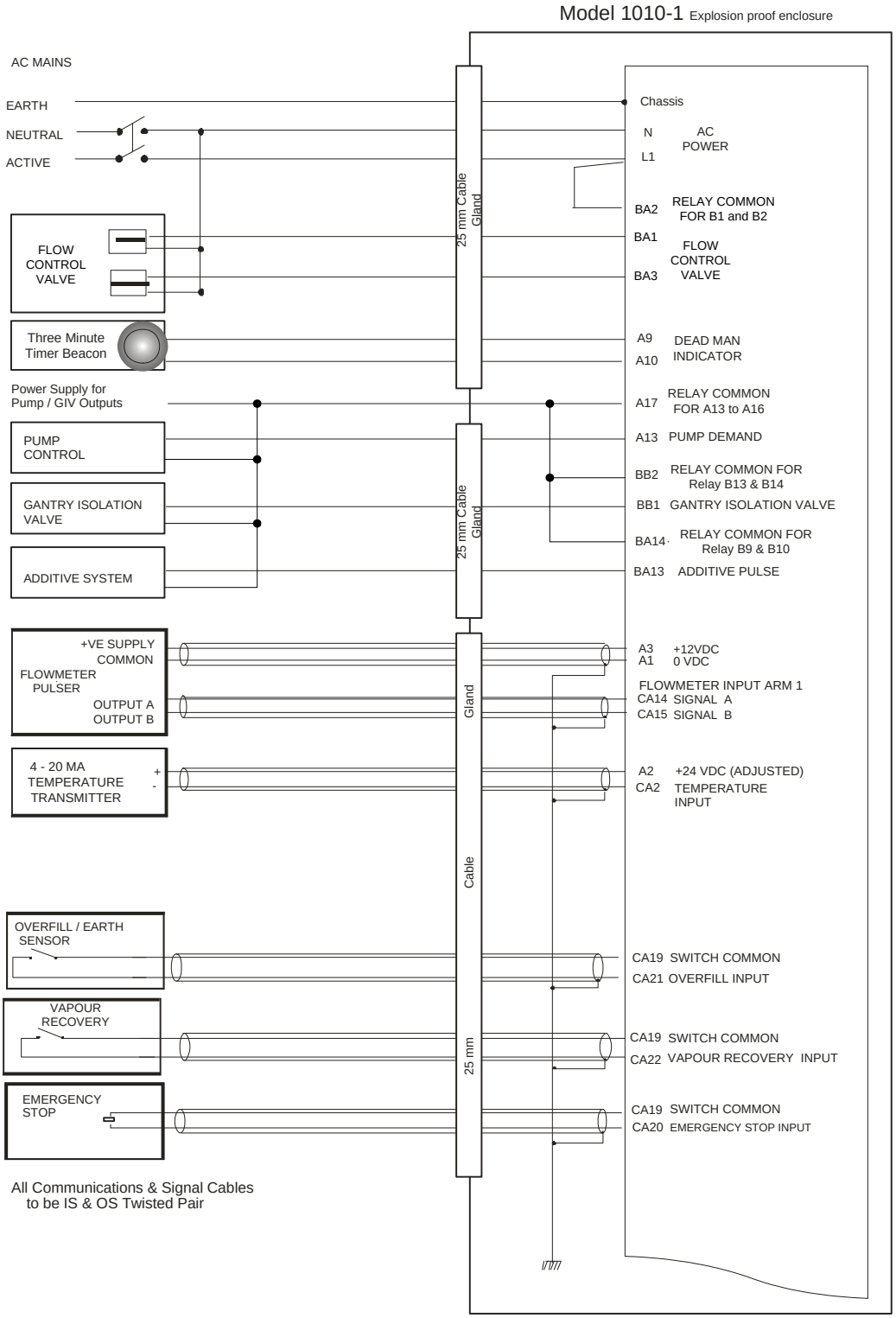
Rating: 240 Vac, 30 Vdc Max 1 Amp max.

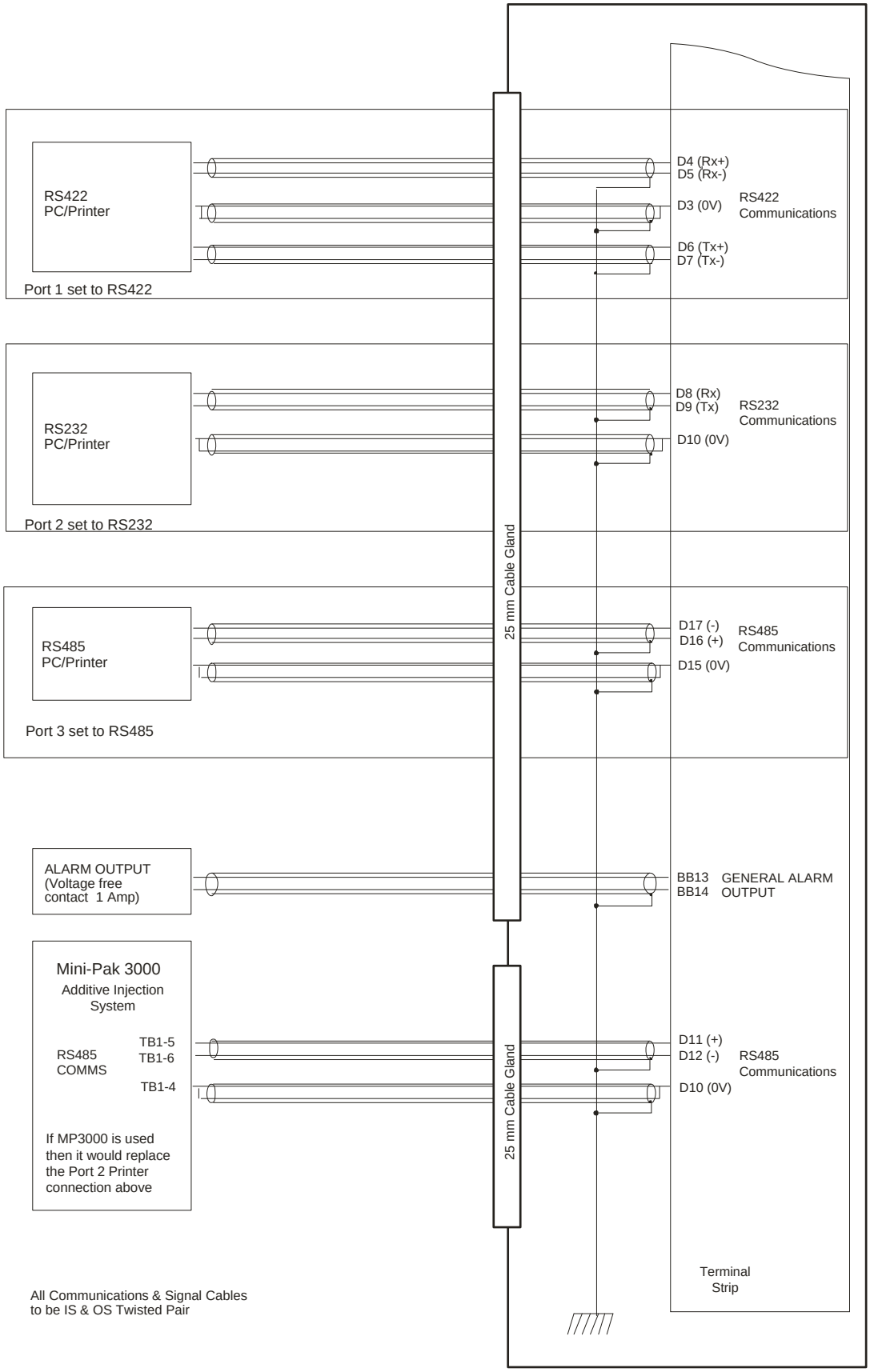
Protection: 275 Vac MOV transient protection



# CHAPTER 2 TYPICAL WIRING DIAGRAM

This section describes a typical wiring diagram for a single arm 1010 installation. This is intended as a guide only.

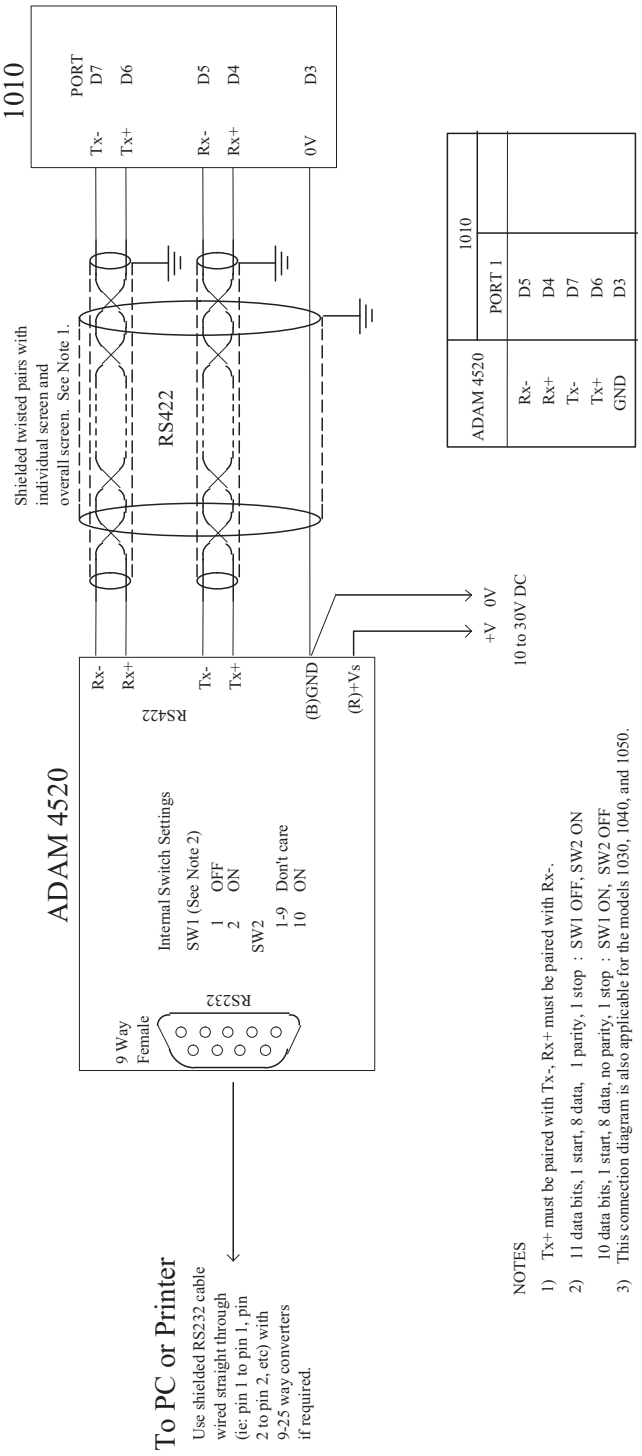



RS422
PC/Printer
Port 1 set to RS422
D4 (Rx+)
D5 (Rx-)
D3 (0V)
D6 (Tx+)
D7 (Tx-)
RS422
Communications
RS232
PC/Printer
Port 2 set to RS232
D8 (Rx)
D9 (Tx)
D10 (0V)
RS232
Communications
RS485
PC/Printer
Port 3 set to RS485
D17 (-)
D16 (+)
D15 (0V)
RS485
Communications
25 mm Cable Gland
ALARM OUTPUT
(Voltage free
contact 1 Amp)
BB13
BB14
GENERAL ALARM
OUTPUT
Mini-Pak 3000
Additive Injection
System
RS485
COMMS
TB1-5
TB1-6
TB1-4
If MP3000 is used
then it would replace
the Port 2 Printer
connection above
D11 (+)
D12 (-)
D10 (0V)
RS485
Communications
25 mm Cable Gland
Terminal
Strip
All Communications & Signal Cables
to be IS & OS Twisted Pair

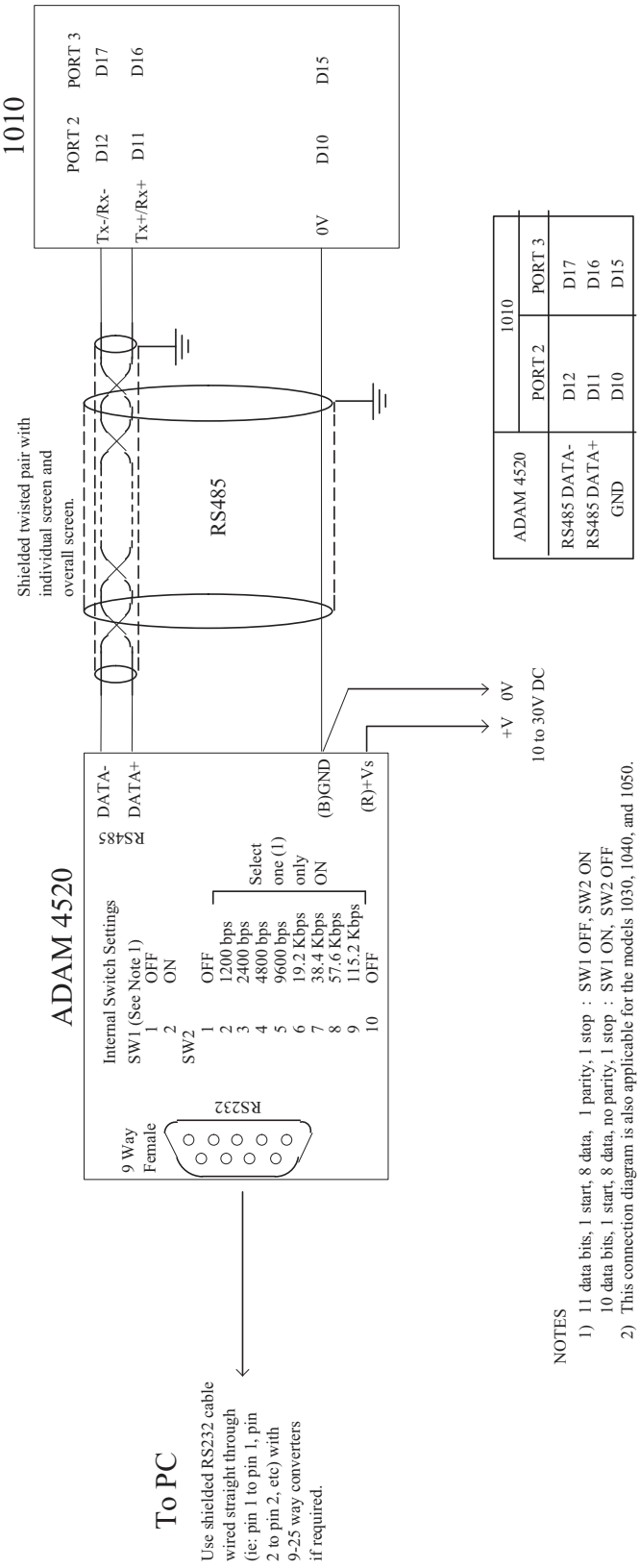
# CHAPTER 3 MODEL 1010 COMMUNICATION CABLES

## 3.1 1010 to PC/Printer via ADAM 4520 RS232/422 Converter

### 3.1.1 2 Twisted Pairs + 0V

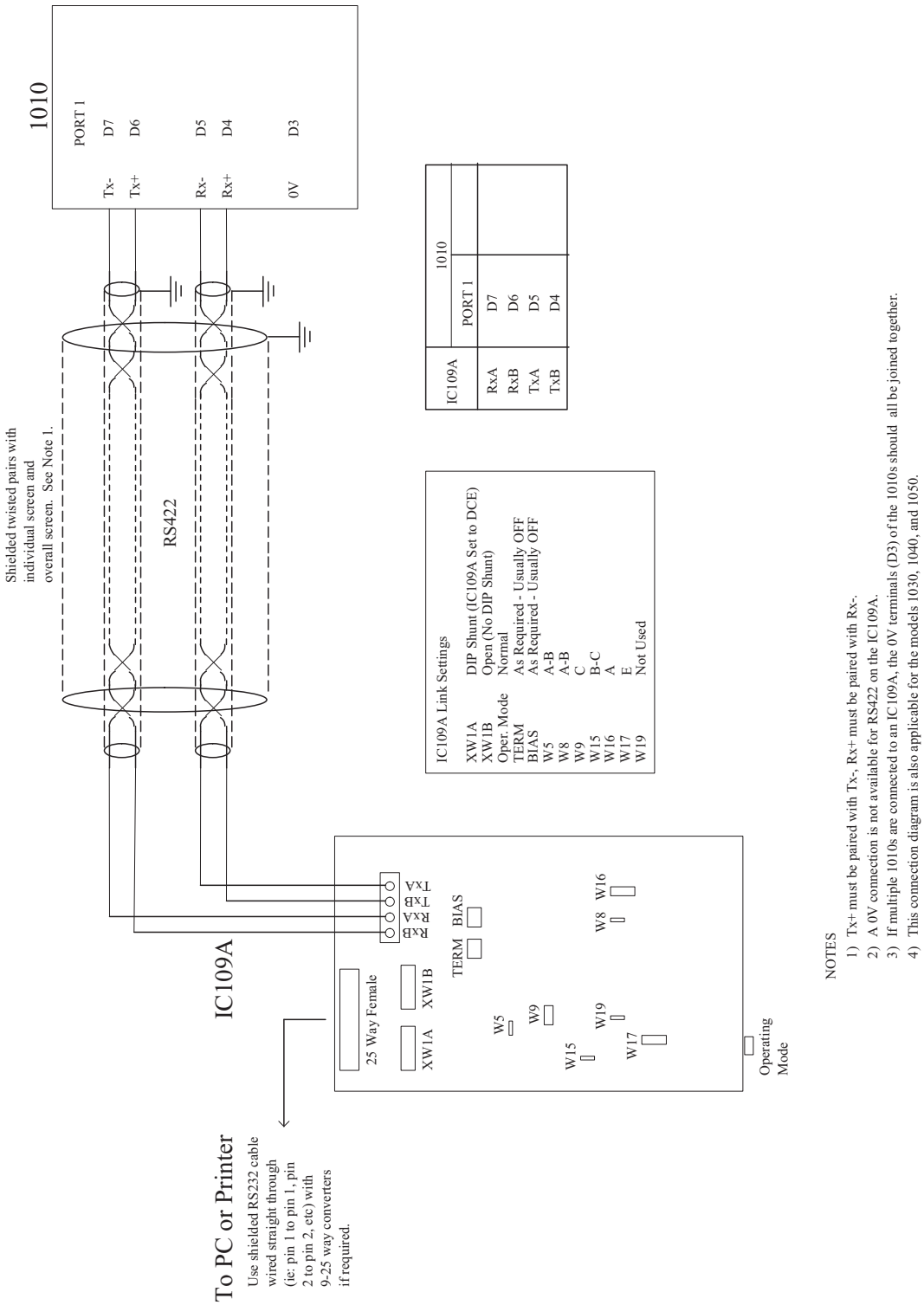


### 3.1.2 1 Twisted Pair + 0V

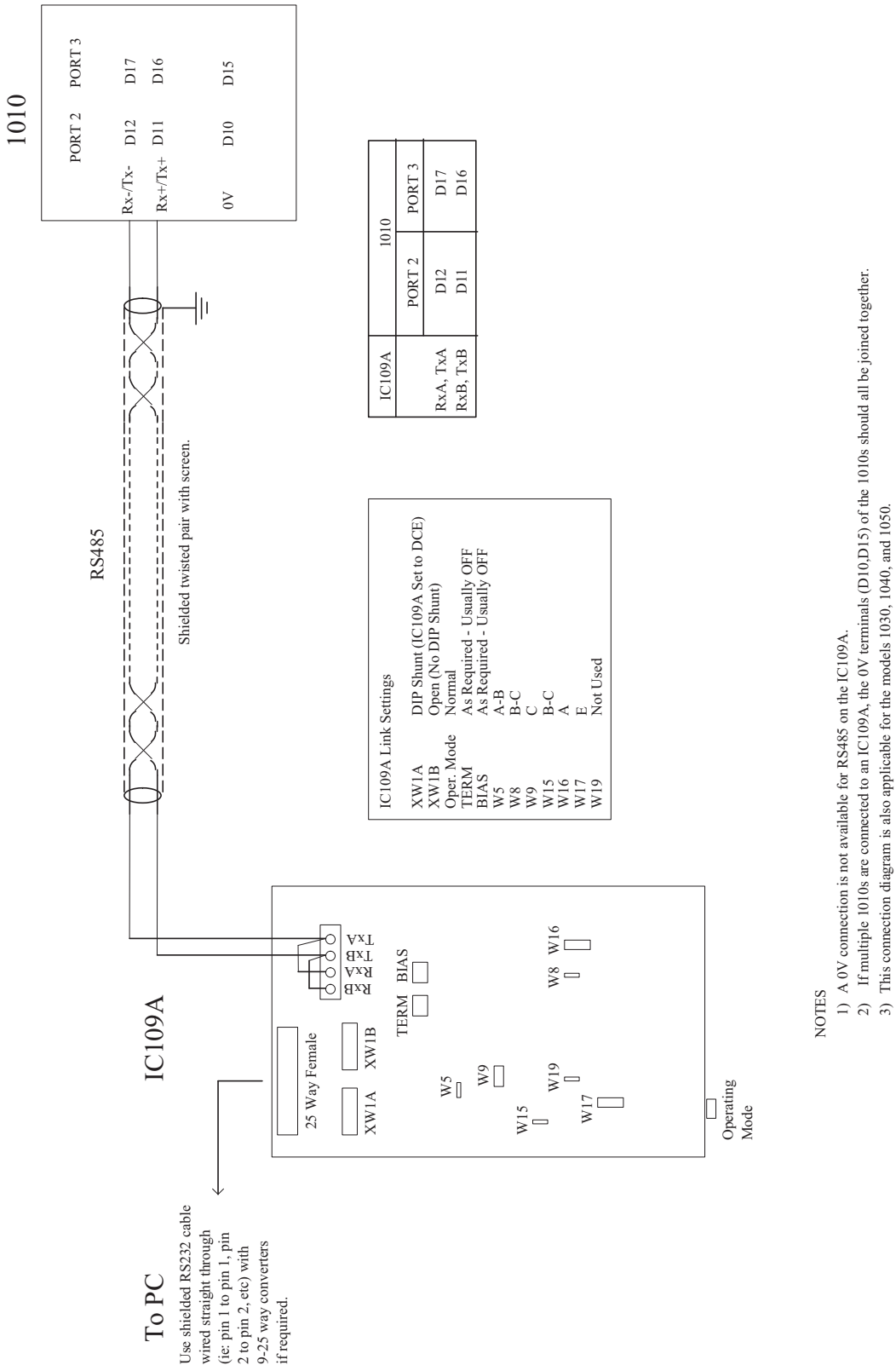


## 3.2 1010 to PC/Printer via Black Box IC109A RS232/485 Converter

### 3.2.1 2 Twisted Pairs



### 3.2.2 RS 485: 1 Twisted Pair

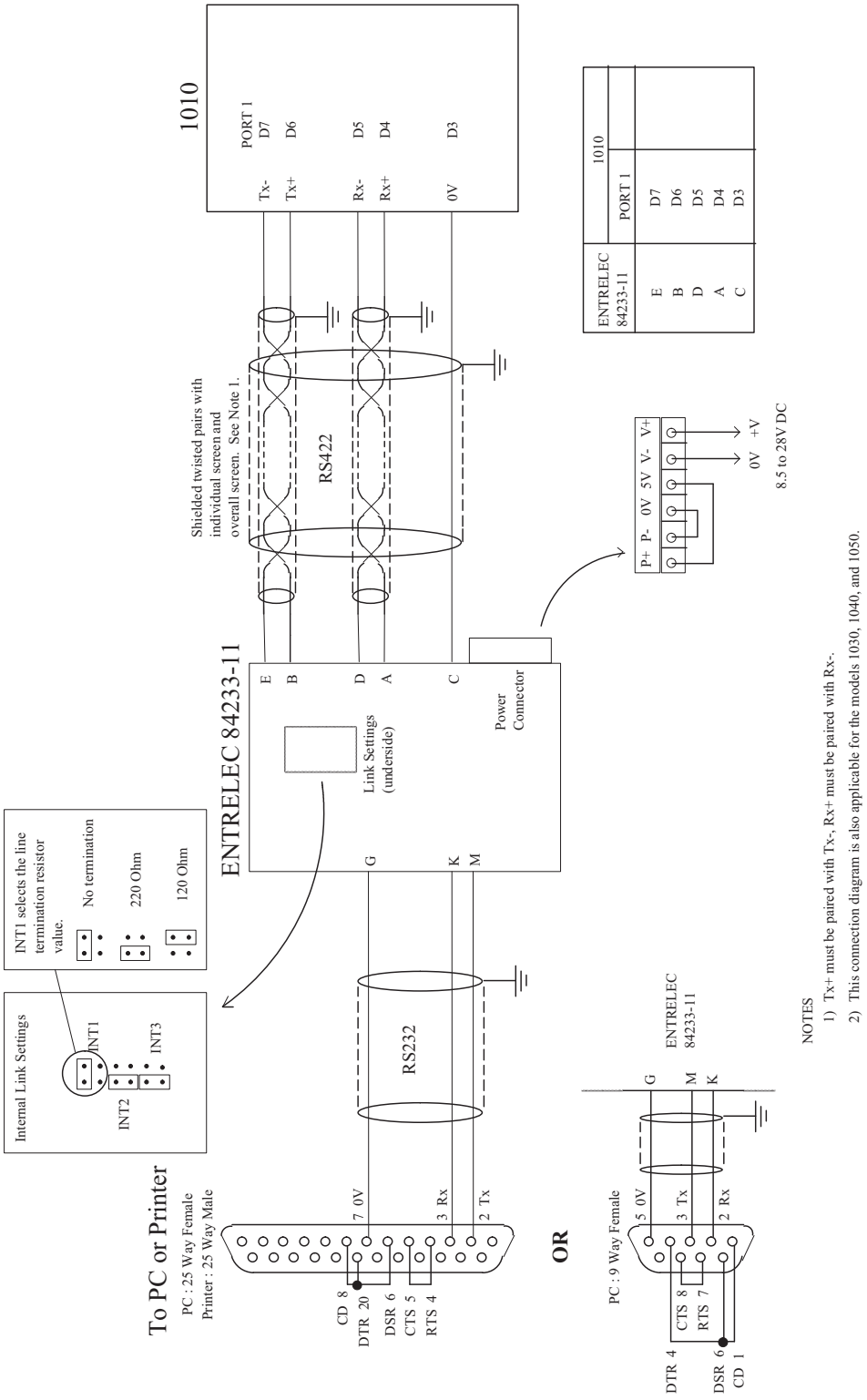



NOTES

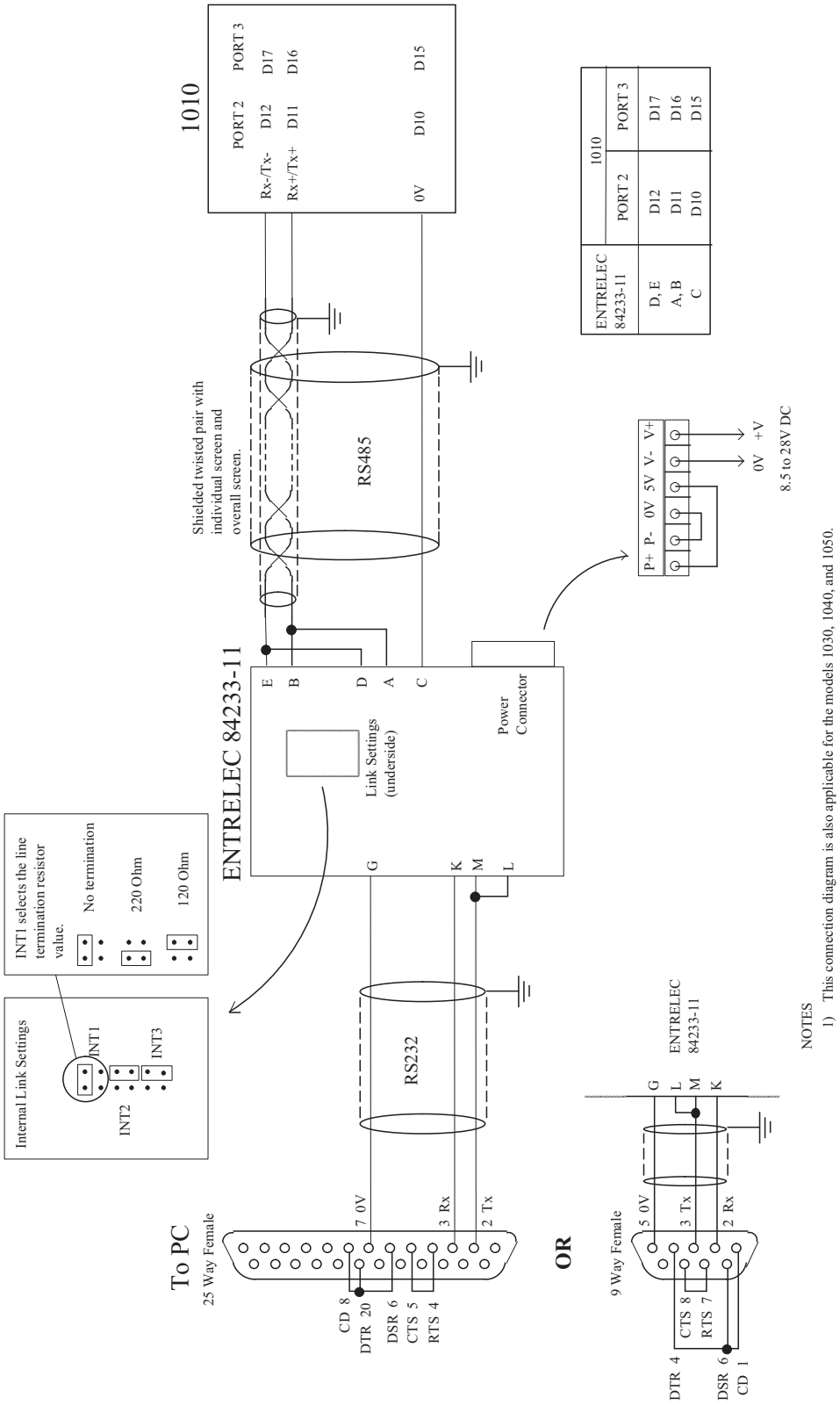
1) A 0V connection is not available for RS485 on the IC109A.
2) If multiple 1010s are connected to an IC109A, the 0V terminals (D10,D15) of the 1010s should all be joined together.
3) This connection diagram is also applicable for the models 1030, 1040, and 1050.

## 3.3 1010 to PC/Printer (RS232) via ENTRELEC 84233-11 Converter

### 3.3.1 RS 422: 2 Twisted Pairs + 0V

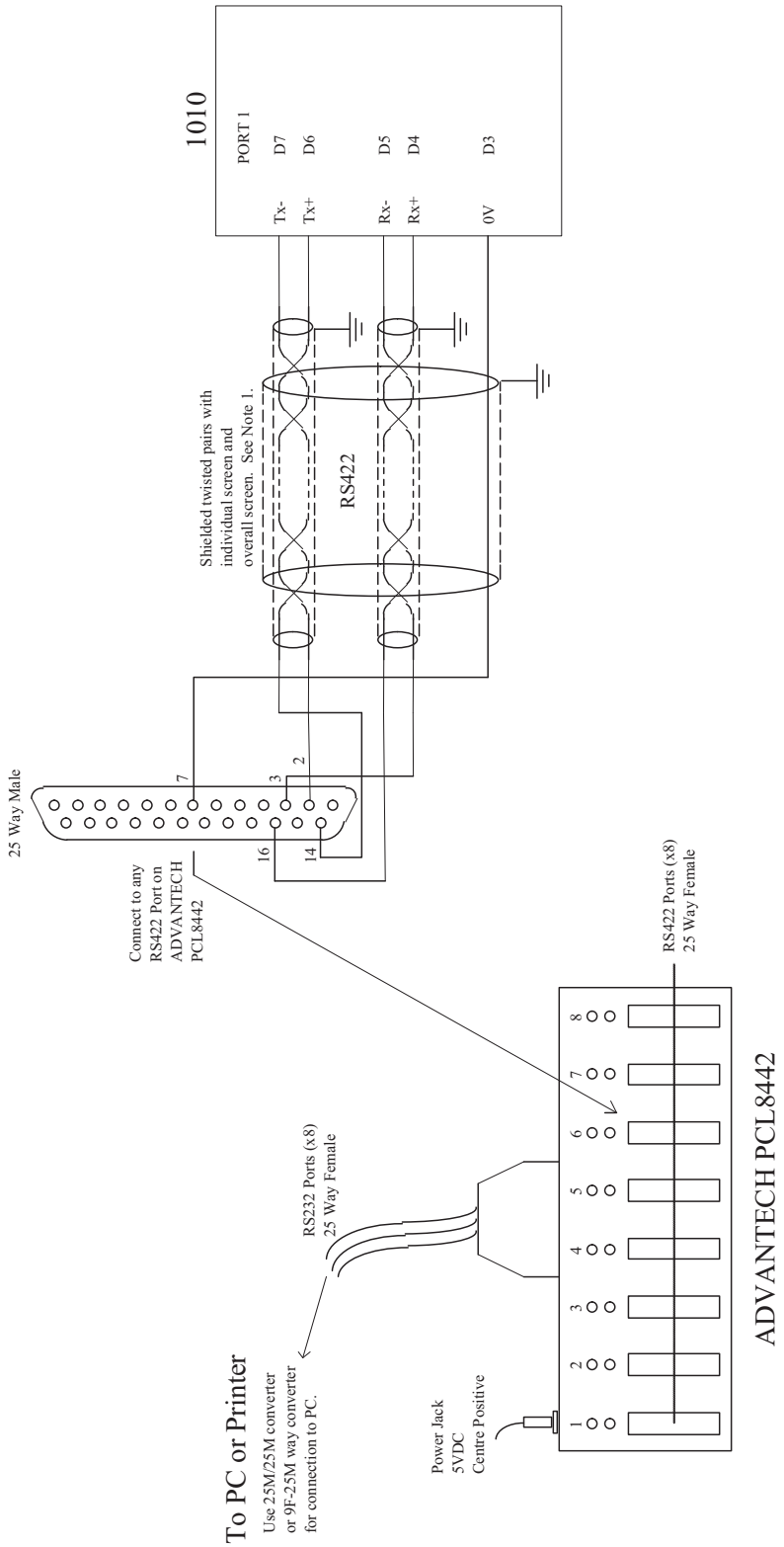


### 3.3.2 RS 485: 1 Twisted Pair + 0V



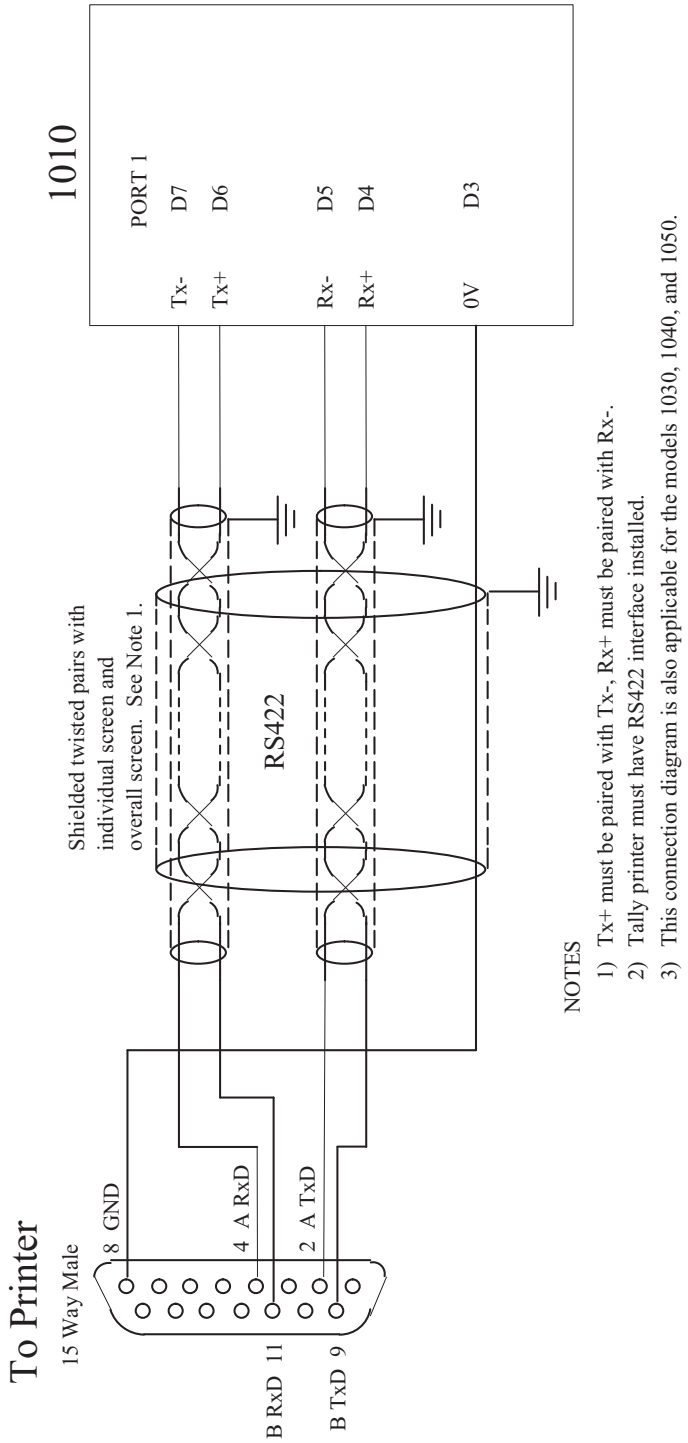
## 3.4 1010 to PC/Printer (RS232) via ADVANTEC PCL8442

RS 422: 2 Twisted Pairs + 0V

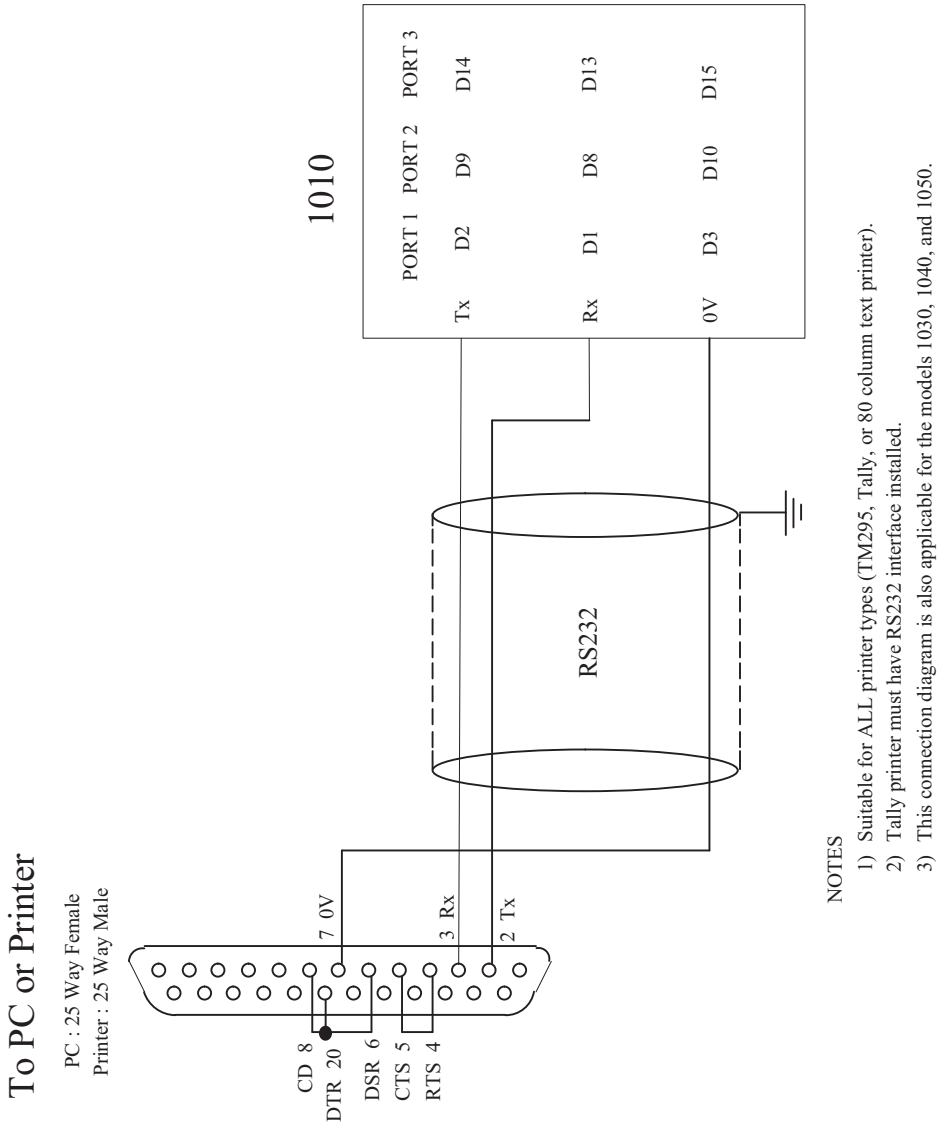


## 3.5 1010 to Tally Printer (RS422)

RS 422: 2 Twisted Pairs + 0V



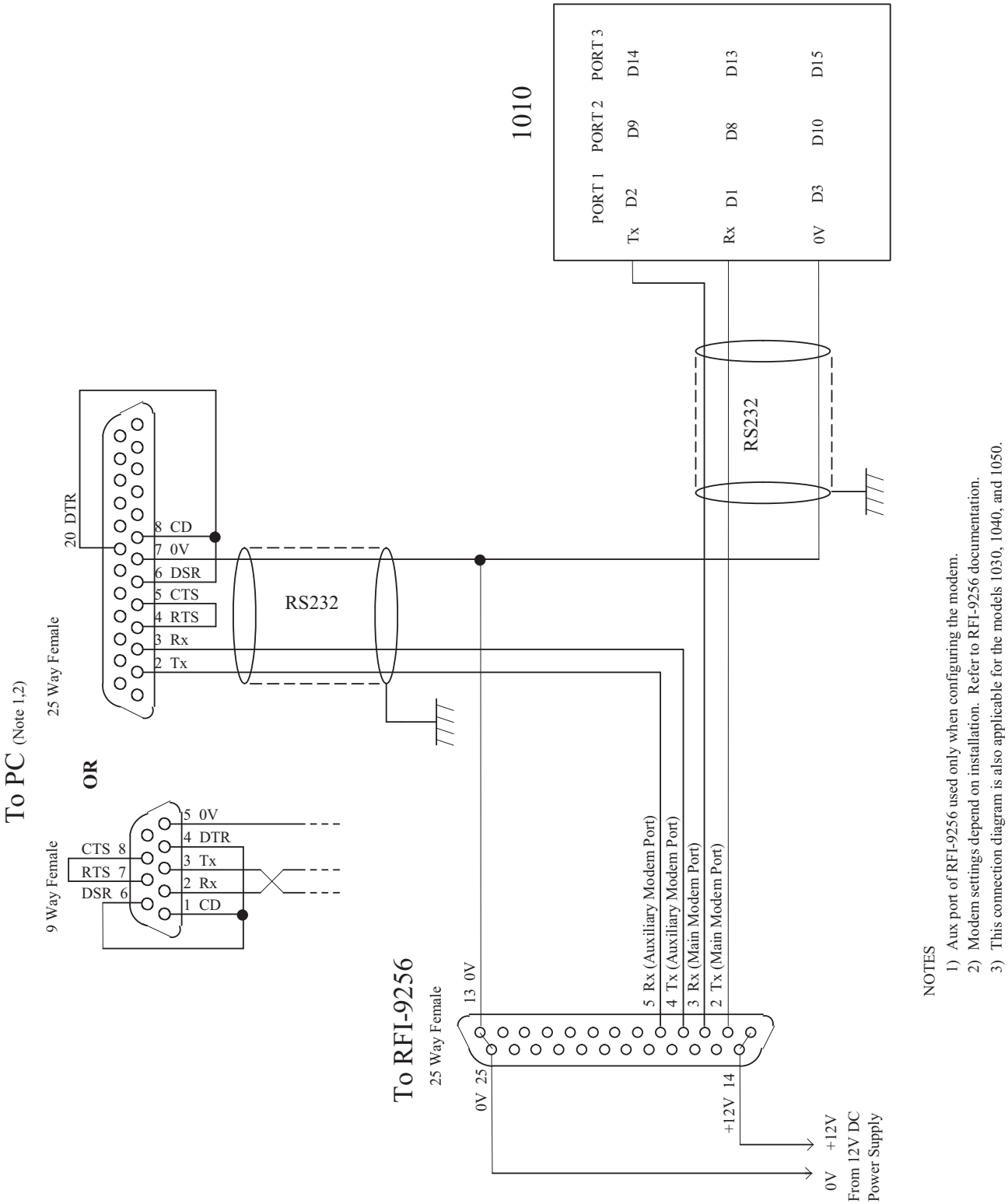
## 3.6 1010 to PC/Printer (RS232)



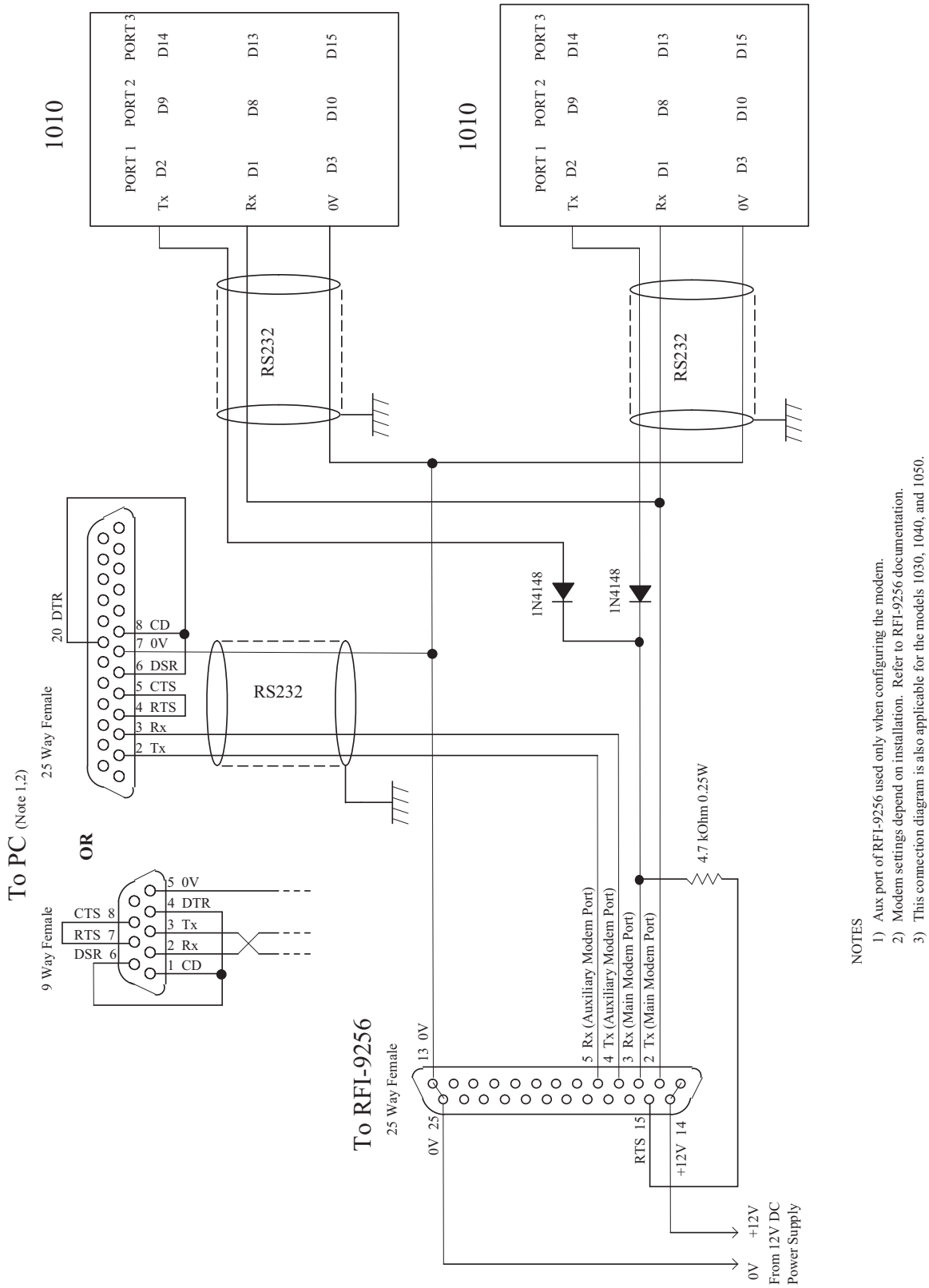

NOTES

1) Suitable for ALL printer types (TM295, Tally, or 80 column text printer).
2) Tally printer must have RS232 interface installed.
3) This connection diagram is also applicable for the models 1030, 1040, and 1050.

## 3.7 1010 to RFI-9256 Radio Modem (RS232)

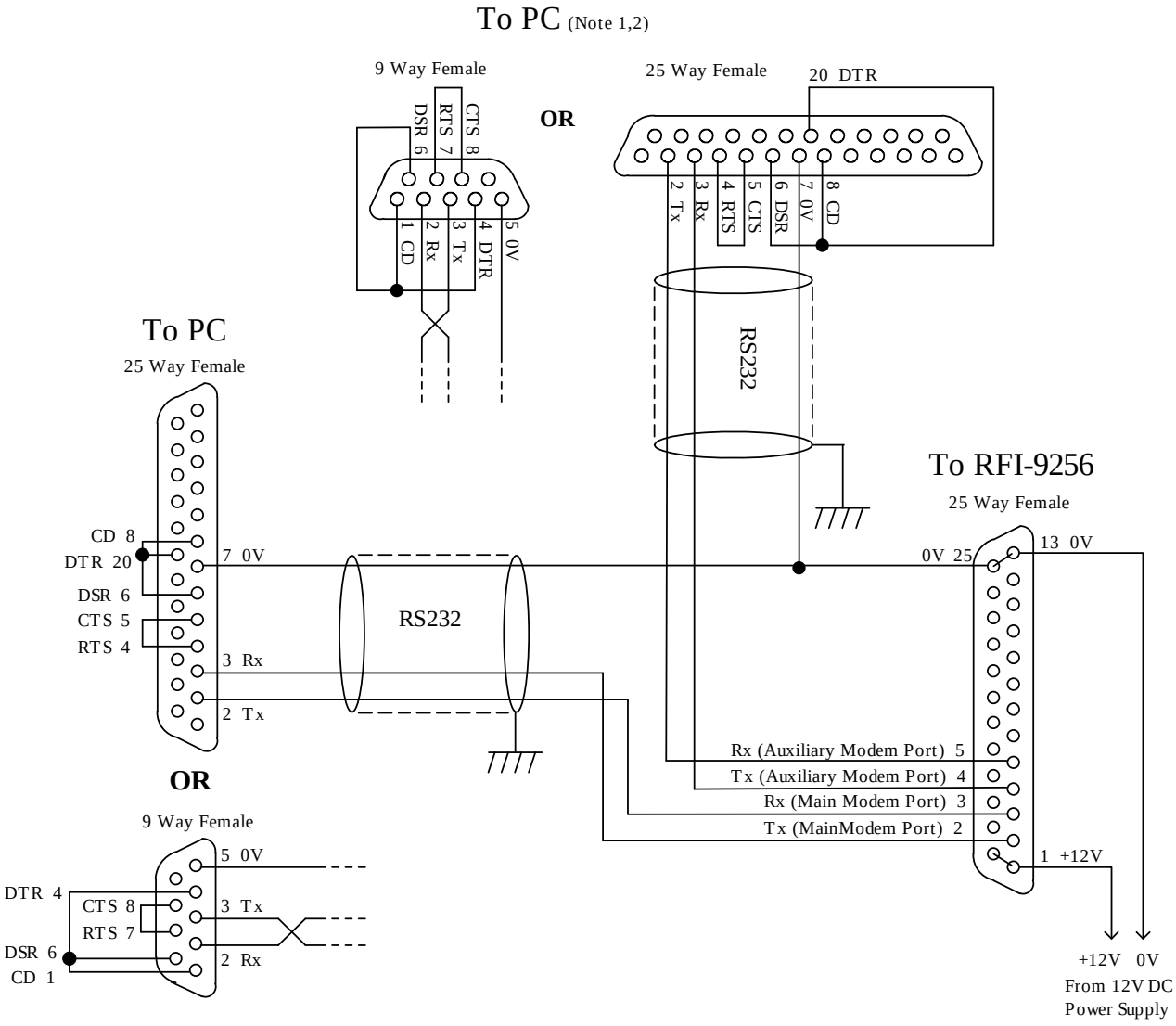


## 3.8 Multiple 1010s to RFI-9256 Radio Modem (RS232)




NOTES
1) Aux port of RFI-9256 used only when configuring the modem.
2) Modem settings depend on installation. Refer to RFI-9256 documentation.
3) This connection diagram is also applicable for the models 1030, 1040, and 1050.

## 3.9 PC to RFI-9256 Radio Modem (RS232)

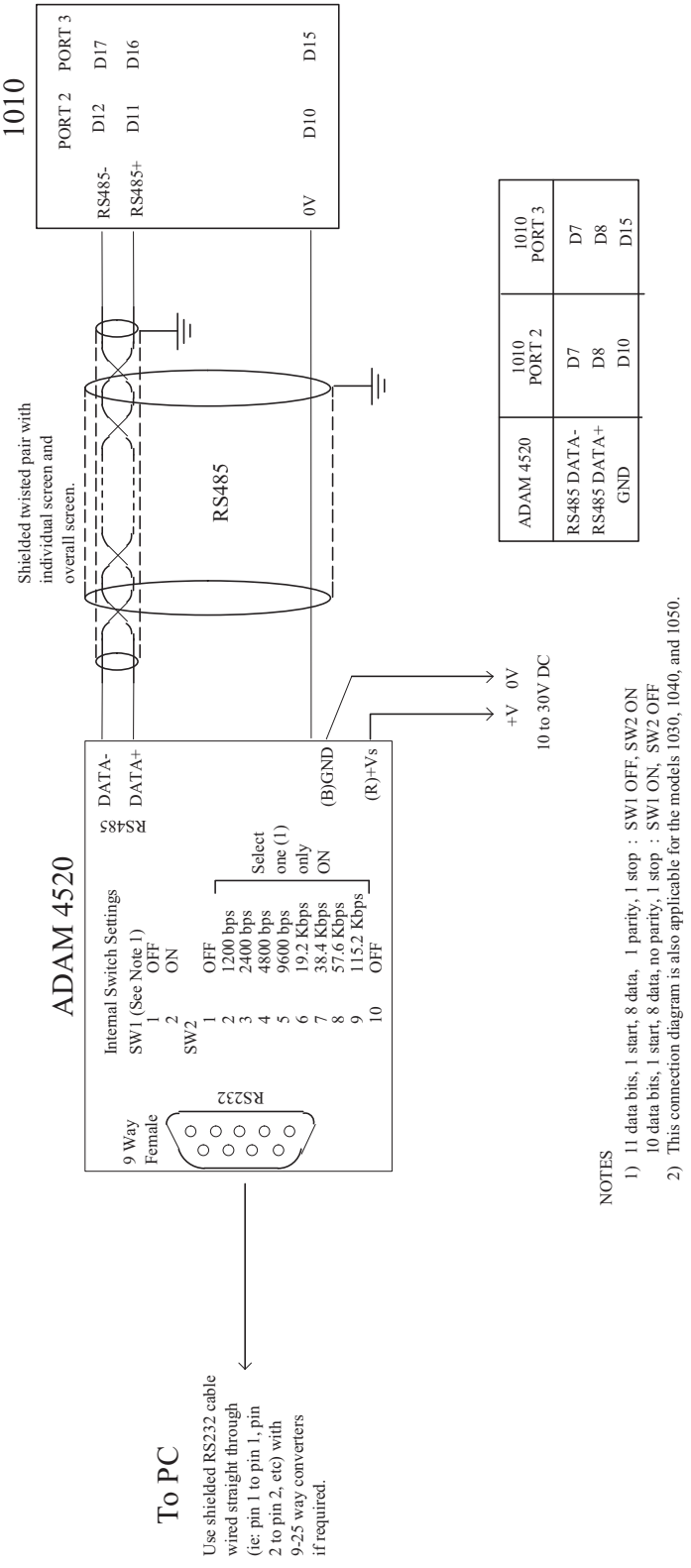



NOTES

1) Aux port of RFI-9256 used only when configuring the modem.
2) Modem settings depend on installation. Refer to RFI-9256 documentation.

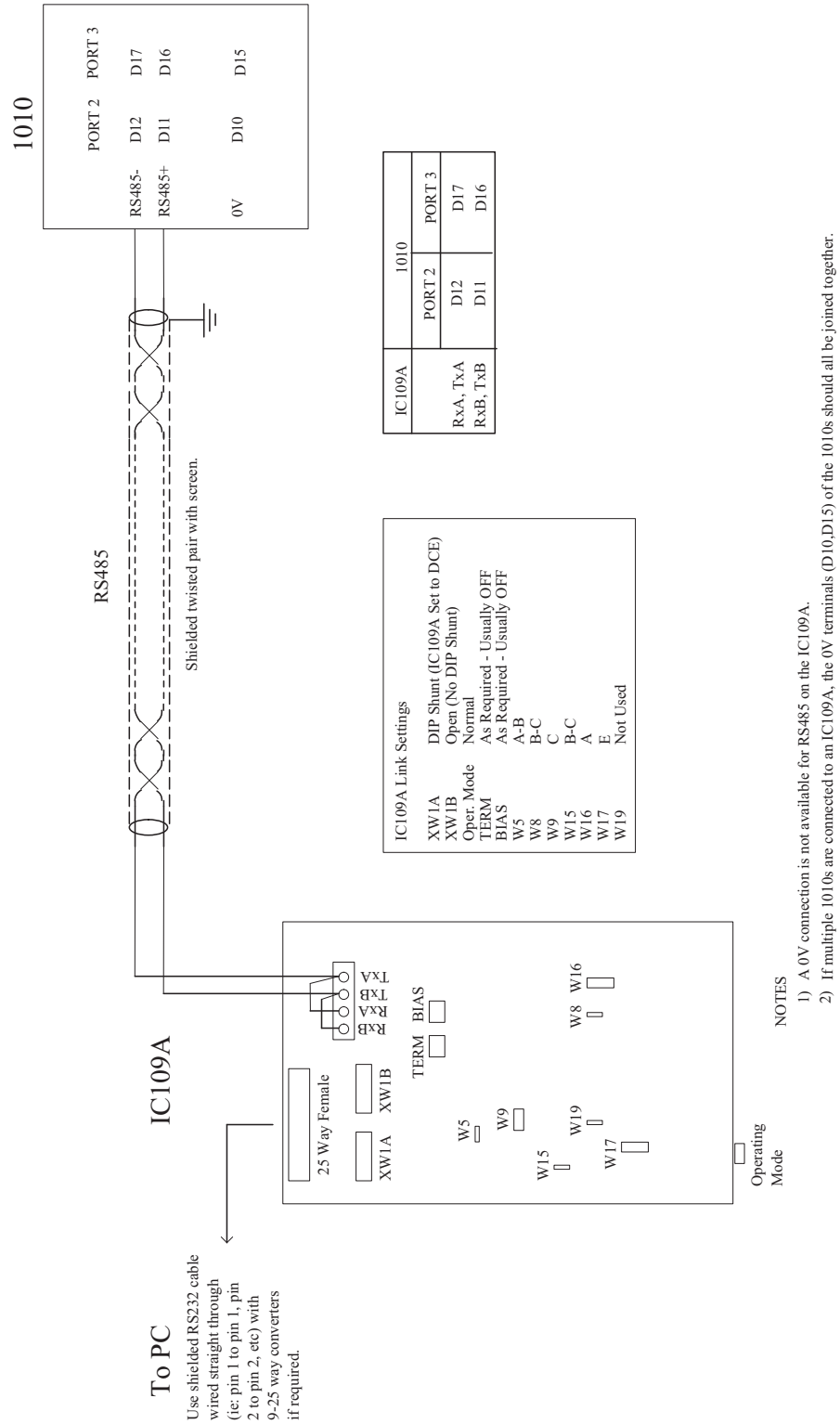
## 3.10 1010 (Isolated RS485) to PC via ADAM 4520 Converter

Isolated RS 485, Single Twisted Pair + 0V



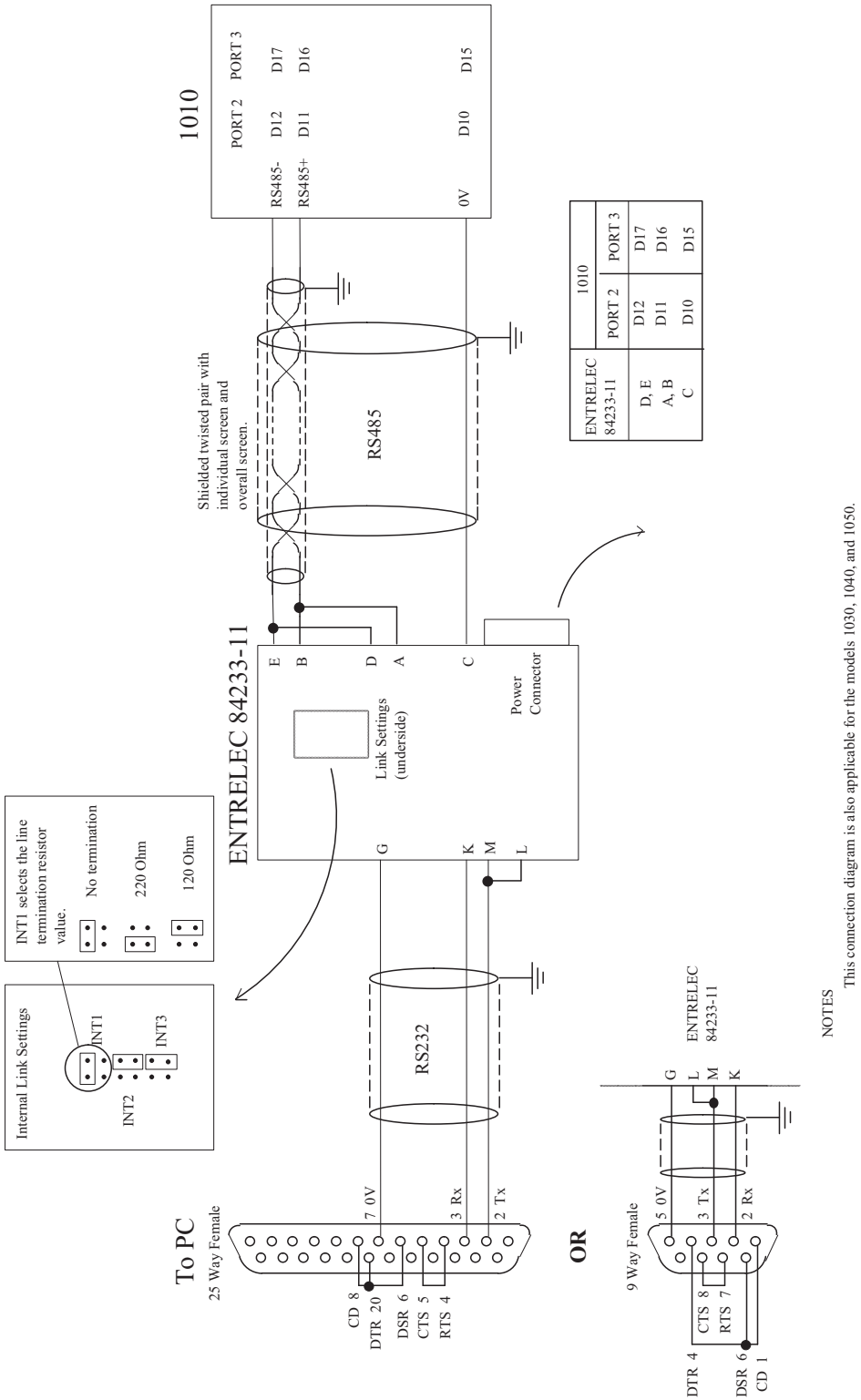
## 3.11 1010 (Isolated RS485) to PC via Black Box IC109A Converter

Isolated RS 485, Single Twisted Pair

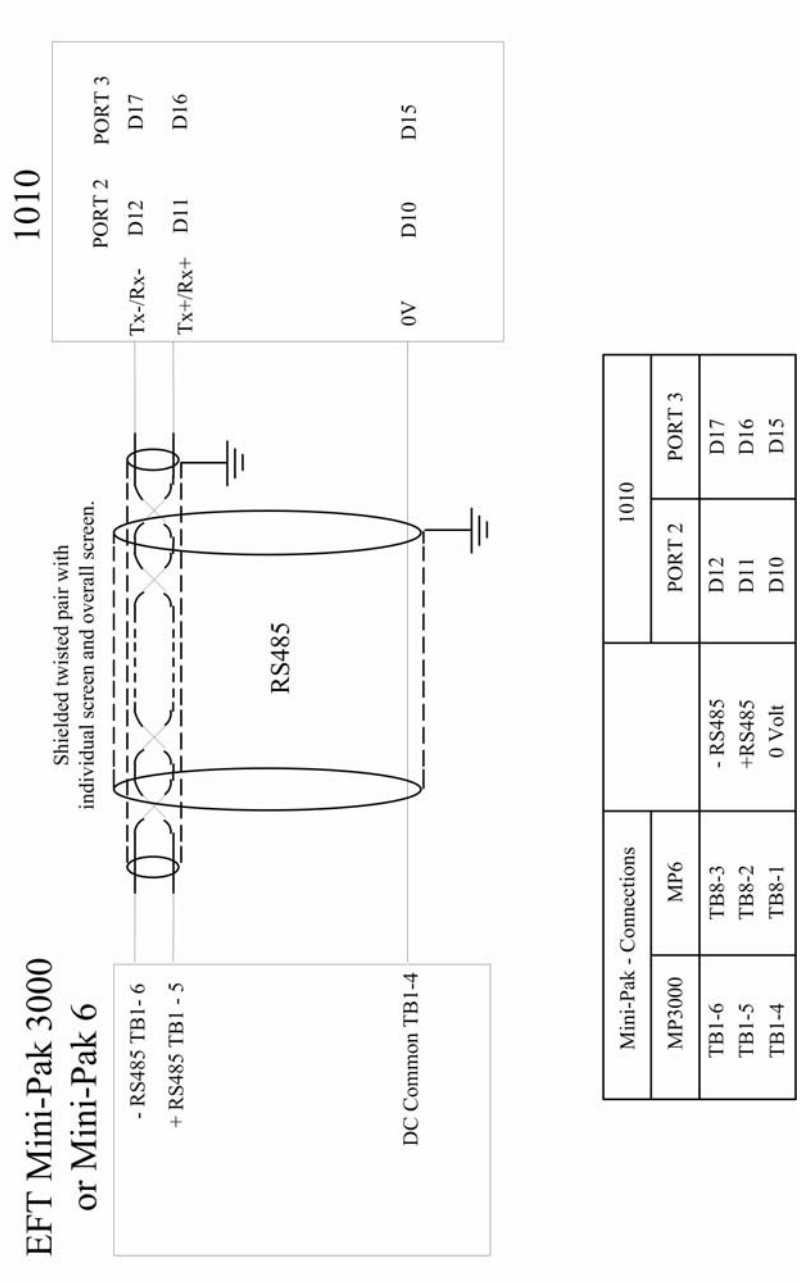


## 3.12 1010 (Isolated RS485) to PC (RS232) via ENTRELEC 84233-11 Converter

Isolated RS 485, Single Twisted Pair + 0V

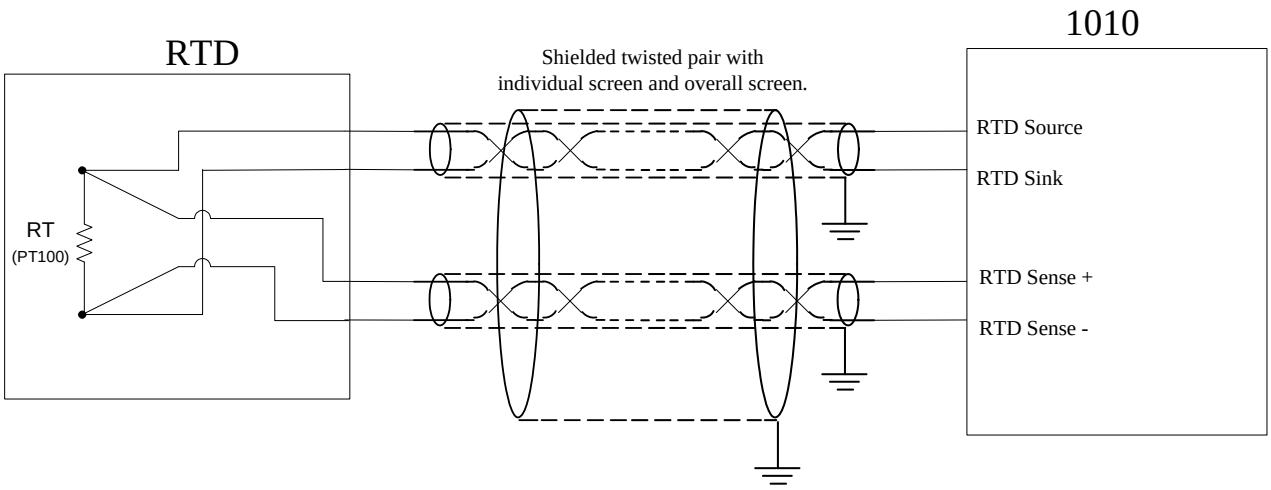


## 3.13 1010 to EFT Mini-Pak Additive Injector

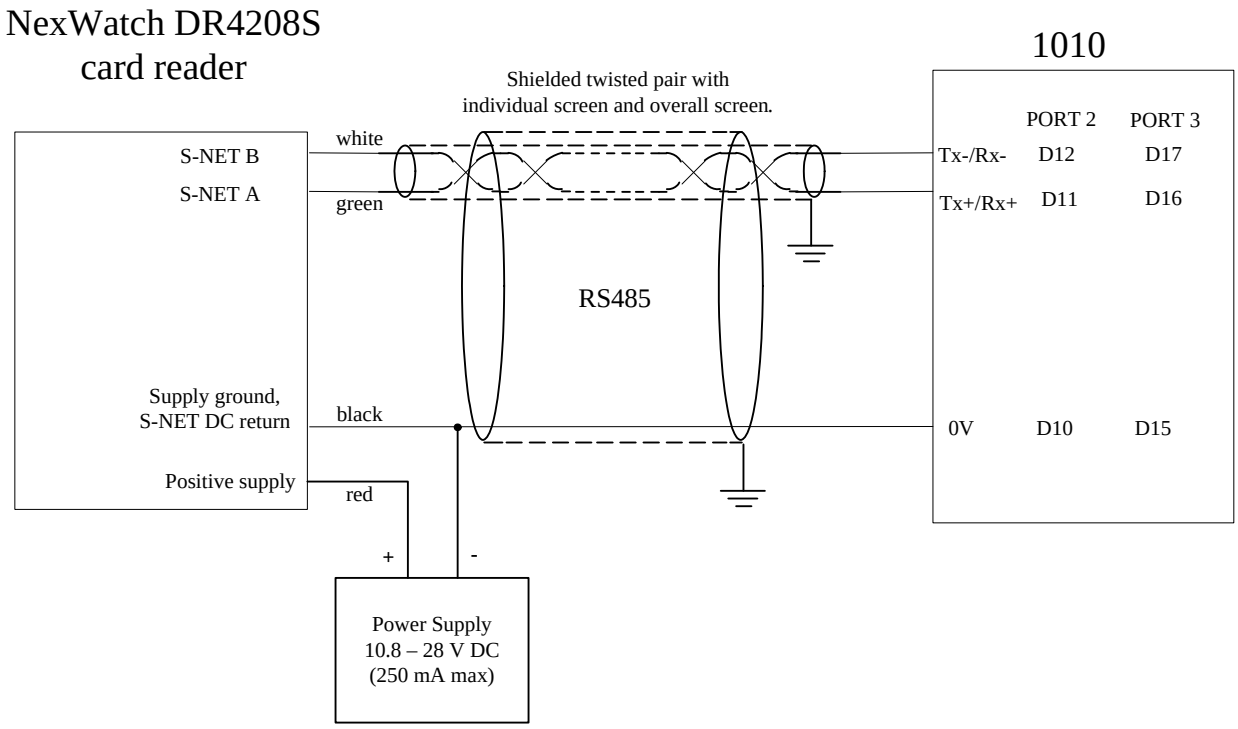



| Mini-Pak - Connections | | | 1010 | |
|---|---|---|---|---|
| MP3000 | MP6 | | PORT 2 | PORT 3 |
| TB1-6 | TB8-3 | - RS485 | D12 | D17 |
| TB1-5 | TB8-2 | +RS485 | D11 | D16 |
| TB1-4 | TB8-1 | 0 Volt | D10 | D15 |

### 3.14 1010 to RTD (PT100)




### 3.15 1010 to NexWatch DR4208S Card Reader



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# CHAPTER 4 SOLID STATE RELAYS

Solid State relays are an ideal method of switching high use equipment such as digital control valve solenoids and additive systems. There is practically no limit to the number switching operations compared to electro-mechanical relays.

The following outputs are Solid State relays:

- The control valve (both digital and on/off)
- The 240 Vac additive

The following outputs are normally electromechanical relays, but can be delivered as Solid State relays if required:

- Pump control outputs
- Gantry isolation valve outputs

Solid state relays are semiconductor switches which electronically switch the power on and off, rather than using an electro-mechanical contact.

The advantages of Solid State relays are:

- Long life
- Elimination of contact arcing and pitting
- No contact bounce, thereby reducing electrical transients inside the instrument
- Faster switching times.

The Solid State relays are particularly important when controlling digital control valves since the control solenoids on these valves are continually being switched on and off to control the flow rate. Using normal moving coil relays in this application would lead to reduced life expectancy.

When applying the Solid State relay, the following output parameters must be observed:

| | |
|---|---|
| Minimum Voltage across relay: | 24 VAC Min |
| Maximum Voltage across relay: | 280 VAC Max |
| AC/DC Switching: | AC Only, (do not apply DC) |
| Maximum Current: | 1 Amp AC |
| Maximum Surge Current: | 1.5 Amp AC |
| Leakage Current: | 20 mA AC Max |

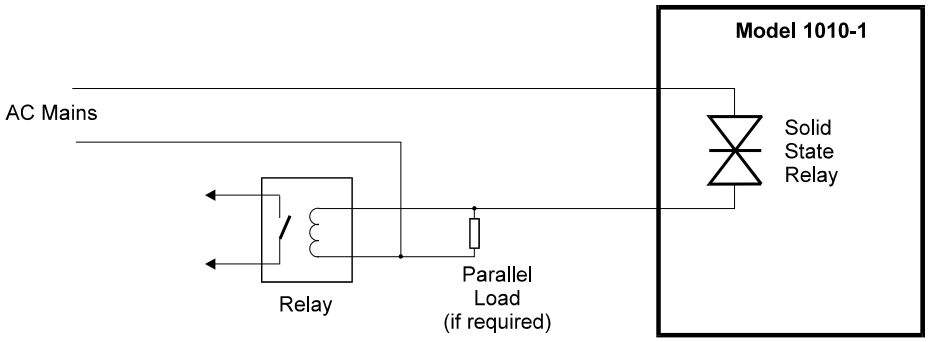
Most digital control valves meet these specifications, but some care must be taken when driving relays or contactors etc, particularly in relation to the leakage current, which is of particular concern in intrinsically safe solenoids.

Unless the load has a holding current greater than 20 mA it may not release. For example, when a relay is first turned on it takes a large amount of current (called the Pickup current) to move the contacts.

Once the relay has been activated it takes far less current (the holding current) to hold the contacts in the active state, called the Holding current.

If a relay had a pickup current of 30 mA and a holding current of 15 mA, the leakage current through the solid state relay would not be enough to activate the relay, but would be enough to hold the relay in the active state, even if the solid state relay was turned off, as the leakage current is always present.

Alternatively, a resistor or other load may need to be placed in parallel across the coil. The resistor diverts some of the leakage current away from the coil so that the relay will deactivate.



# GLOSSARY

**authorisation** Type of authorisation. Can be PIN, touch key, RF ID, or NexWatch. For more information, see chapter 8 “Authorisation Entry Mode” in the 1010CJ Programming Manual.

**authorisation number** A number that is programmed into the instrument to allow access to the instrument after presenting *authorisation*.

**batch** Individual loading of product using a single loading arm.

**BOL** Bill of Lading. A document that is used to acknowledge the receipt of a shipment of goods.

**computer** A computer, Distributed Control System (DCS), Load Rack Computers (LRC), or Terminal Automation System (TAS) that is attached to an instrument.

**entry** term formally used to describe a batch

**extended wait period** Time, in addition to the wait period, required because a command prevents the instrument responding for an extended time.

**instrument** A 1010 Loading System.

References to 1010-1 (Single arm unit), 1010-2 (two arm unit) and 1010-4 (four arm unit), relate to those models of the generic Model 1010 loading system.

**intelligent additive injection** An automated additive injection system that connects to the instrument by a serial communications port. Mini-Pak is one example of this.

**load** *See also* “batch”

**Honeywell Enraf Mini-Pak** *See* “Mini-Pak”

**Mini-Pak** An automated additive injection system.

**OIML** International Organization of Legal Metrology

**proving run** One completed batch or loading operation carried out with the Automated Proving Mode enabled.

**service display** Two line display that shows the loading information for a selected parameter for the selected arm.

**unathorised flow** Flow that is recorded by a meter without being authorised (by an operator pressing the START key button).

**unit address** The address byte a computer uses to direct information to the desired instrument

**wait period** The time the computer waits for a response after sending a command to the instrument. Generally 300 millisecond.

*See also* “extended wait period”.

**Weights and Measures switch** A switch that is mounted on the instrument exterior, that be fitted with a lead tamper seal for W&M requirements.

On the Model 1010A the switch is located on the lower right-hand side of the enclosure.

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